

The
Economist

THE WORLD AHEAD 2025

Donald Trump returns *The global consequences* • Trade wars *A tariffing prospect*
Geopolitics *What now for America's allies?* • Immigration *The coming border crackdown*
Climate *Time to talk about geoengineering* • Crunch year for AI *Will the \$1trn gamble pay off?*



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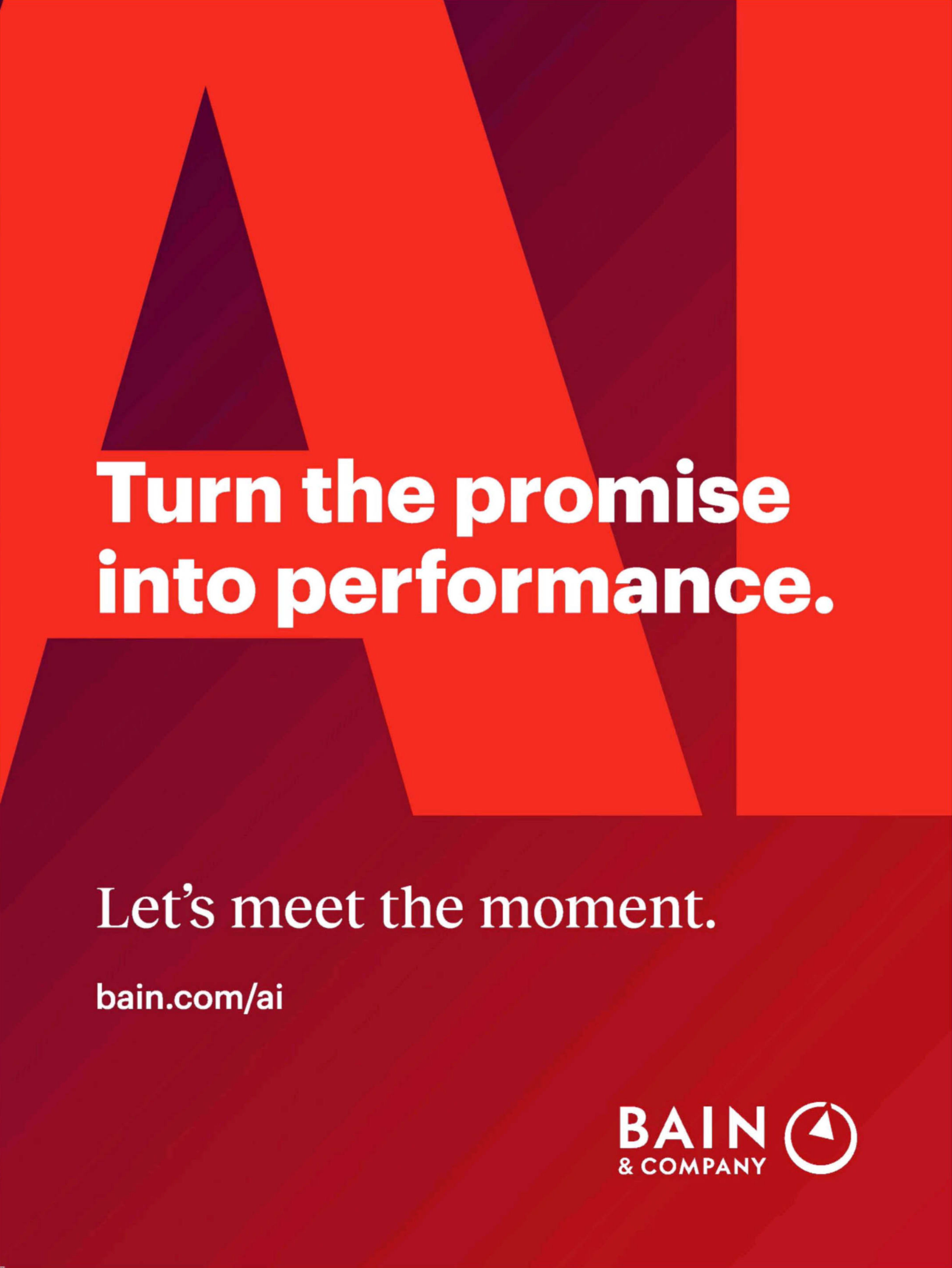
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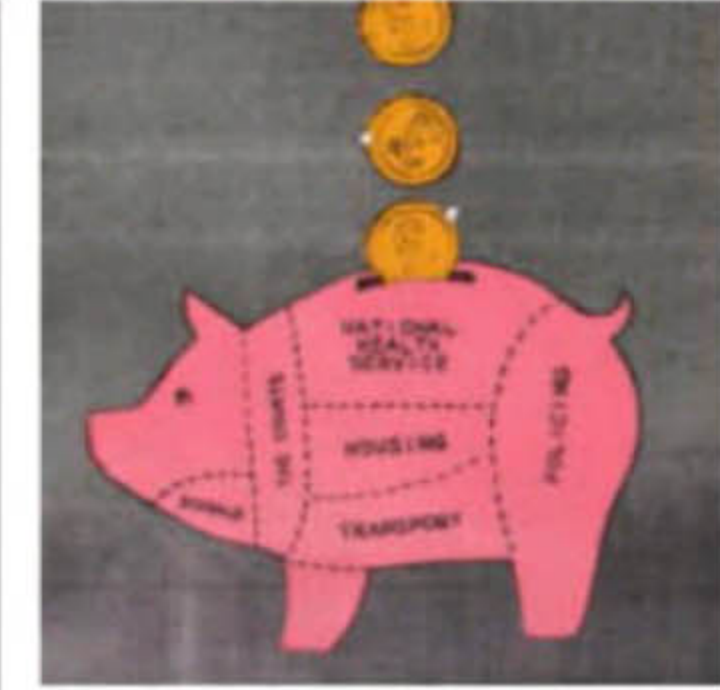
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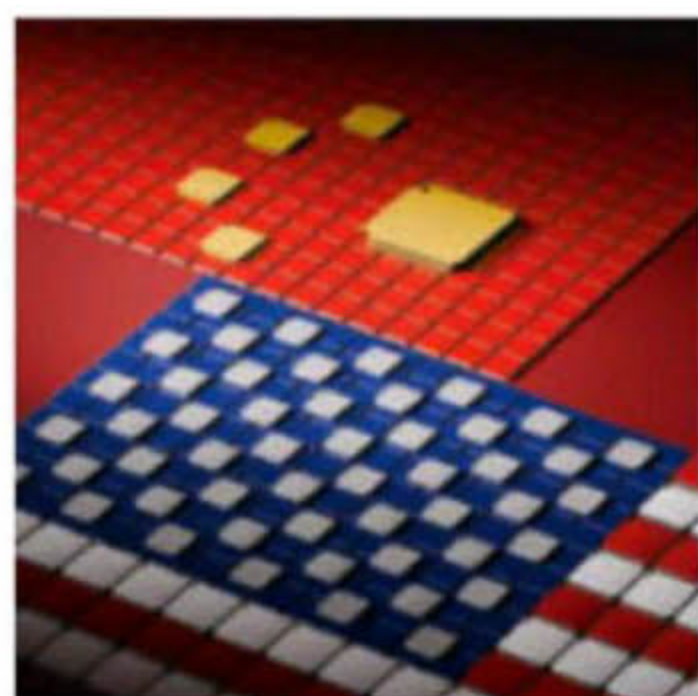
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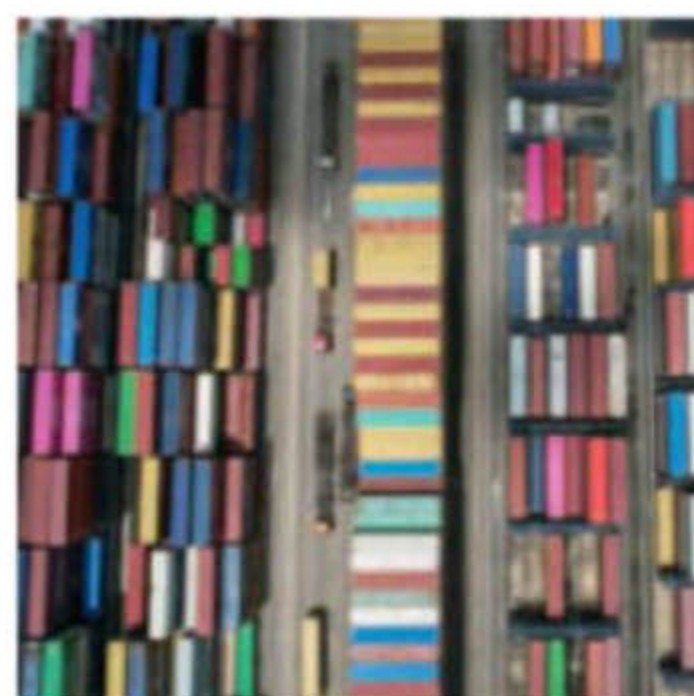
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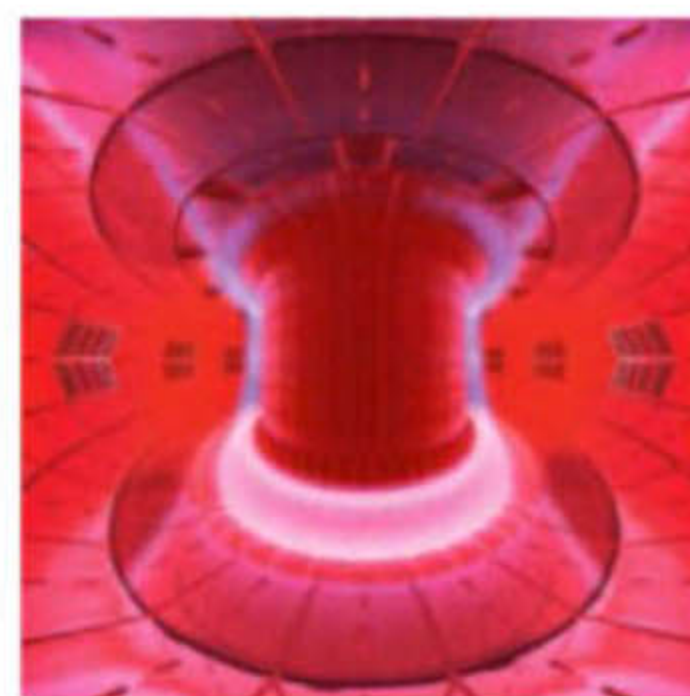
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The
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The World Ahead 2025

From the editor

IT SEEMS APPROPRIATE that 2025 has been designated the year of quantum science and technology by the United Nations. Because like Schrödinger's cat, which (in a quantum thought-experiment) was both alive and dead at the same time inside a closed box, 2025 has hovered in a superposition of two very different states, defined by the outcome of America's election. Now the ballot boxes have been opened, the world knows which 2025 to expect: the one where Donald Trump returns to the White House. With that uncertainty resolved, here are ten themes to watch in the coming year.

1. America's choice.

The repercussions of Mr Trump's sweeping victory will affect everything from immigration and defence to economics and trade. His "America First" policy will have friends and foes alike questioning the solidity of America's alliances. This could lead to geopolitical realignments, heightened tensions and even nuclear proliferation.

2. Voters expect change.

More generally, incumbent parties did badly in 2024's unprecedented wave of elections. Some were chucked out (as in America and Britain); others were forced into coalition (as in India and South Africa); others were pushed into cohabitation (as in Taiwan and France). So 2025 will be a year of expectations. Can new leaders deliver what they promised? Will humbled leaders change? If not, unrest may follow.

3. Broader disorder.

Mr Trump may push Ukraine to do a deal with Russia and give Israel a free hand in its conflicts in Gaza and Lebanon. America's more transactional stance and scepticism of foreign entanglements will encourage troublemaking by



China, Russia, Iran and North Korea (the "quartet of chaos") and more meddling by regional powers, like that seen in crisis-hit Sudan. But it is unclear whether America would stand up to China in a conflict over Taiwan or in the South China Sea.

4. Tarrifying prospects.

For now, America's rivalry with China will manifest itself as a trade war, as Mr Trump imposes restrictions and ramps up tariffs—including on America's allies. As protectionism intensifies, Chinese firms are expanding abroad, both to get around trade barriers and to tap new markets in the global south. So much for decoupling; Chinese firms,

building factories from Mexico to Hungary, have other plans.

5. Clean-tech boom.

China's government has encouraged booming exports of solar panels, batteries and electric vehicles to offset a weak domestic economy. The result is a Chinese-led clean-tech boom, with adoption of solar panels and grid storage outstripping forecasts. And the world will soon learn whether global emissions have peaked.

6. After inflation.

The rich world's central bankers have celebrated the defeat of inflation. Now Western economies face a new challenge: reducing deficits, by increasing taxes, cutting spending or boosting growth. Many may also have to increase defence budgets. Painful economic choices loom. In America, Mr Trump's policies will make things worse: hefty import tariffs could hamper growth and reignite inflation.

7. Age-old questions.

America has just picked its oldest-ever president-elect. World leaders are greying, along with their populations. Expect more discussion of age limits for political leaders. China, meanwhile, is looking for economic opportunities in an ageing world. In parts of the Middle East, by contrast, a booming youth population, coupled with a shortage of jobs, risks instability.

8. Crunch time for AI.

It's the biggest gamble in business history: more than \$1trn is being spent on data centres for artificial intelligence (AI), even though companies are still not sure how to use it and adoption rates are low (though many workers may simply be using it in secret). Will investors lose their nerve, or will AI prove its worth, as "agentic" systems become more capable and AI-developed drugs emerge?

9. Travel troubles.

The global movement of people, not just goods, faces increasing friction. Conflict is disrupting global aviation. Europe is adding new border checks, and its borderless Schengen system is fraying. The backlash against "overtourism" will diminish in 2025, but restrictions introduced by many cities, from Amsterdam to Venice, will remain.

10. Life of surprises.

With assassination attempts, exploding walkie-talkies and giant rockets being captured by chopsticks, one lesson of 2024 was to expect the unbelievable. What implausible-sounding things could happen in 2025? Our "Wild cards" section offers a selection to watch out for, including a devastating solar storm, the discovery of lost ancient texts—and even another global pandemic.

To navigate the future, it can help to anticipate the unlikely. We hope you will find *The World Ahead 2025* a useful guide to the coming year, whatever surprises await. ●

Tom Standage

Editor, *The World Ahead 2025*

2025 will be a year of expectations. Can new leaders deliver?

Great Trade opens doors

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Robert Sánchez
Premier League Goalkeeper



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Leaders

Trump, technology and uncertainty

A guide to the forces that will shape 2025



WHAT HAPPENS when the world's biggest economy takes a sharp protectionist turn? When the global superpower decides that a transactional foreign policy beats alliances? And when the reset takes place as wars rage, menacing adversaries join forces and artificial intelligence (AI) is changing everything from health care to warfare? The world is about to find out.

In the campaign Donald Trump promised massive change. That is possible, but the rhetoric of campaign speeches is quite different from the reality of governing. The people Mr Trump chooses for his team and the priorities they focus on will determine how much he can accomplish. His early appointments suggest an emphasis on loyalty, hawkishness and disruption.

Foreign-policy tests will come fast. Mr Trump has repeatedly said he will end the war in Ukraine in a single day and will face pressure to get a deal quickly. As the first example of his supposedly muscular diplomacy, the outcome will ripple around the world. If Mr Trump presses Ukraine to accept territorial losses, but offers a security guarantee that durably deters Vladimir Putin, America's (and Mr Trump's) credibility will be enhanced. But if he forces Ukraine into a lopsided peace deal that leaves it vulnerable to Russia, Mr Putin will have won. Ukraine's survival will then depend on whether Europeans can defend it—a test they are likely to fail (see leader). China and other would-be aggressors will take note: American promises are empty.

The Middle East will pose early tests of a different sort. Mr Trump may well succeed in getting Israel and Hamas to agree to a ceasefire in Gaza; Binyamin Netanyahu will want to give him a quick win. But Mr Trump is unlikely to steer Israel towards the only long-term solution—a path to a Palestinian state. He will

want to be tough on Iran, not least because it may have plotted to assassinate him. But “maximum pressure”, his administration's sanctions policy in his first term, will now prove less powerful. Iran has built a shadowy network to sell its oil, mainly to China.

The most important geopolitical choice will be how to deal with China. Though its economy is currently weak, China is both a more aggressive and more formidable adversary than when Mr Trump first became president in 2017. He could swiftly face a crisis in the South China Sea. Whether he assists the Philippines or abandons it will be a key test.

China will also reveal how extreme Mr Trump is about tariffs. He has promised 60% levies on imports from China (and 10-20% on all other countries). Is this negotiating bluster or a real desire to decouple America's economy from China's? That will become clear in 2025, not least because implementing tariffs will compete for attention with Mr Trump's other priorities.

Top of that list will be illegal immigration. Expect a showy effort at mass deportations. Tax cuts will also be high on the agenda because Mr Trump's first-term tax package expires at the end of 2025. He added some \$10trn-worth of new tax-cutting promises during the campaign. But even though Republicans hold both houses of Congress, lawmakers are nervous about budget-busting on that scale.

With luck, the most consequential part of Mr Trump's domestic agenda will lie elsewhere: in a programme to deregulate and reinvent the machinery of government, from drug regulation to military procurement. These reforms will determine how quickly America adopts and diffuses cutting-edge technologies including biotech and AI. Elon Musk will be in charge. His promise to slash the federal budget by \$2trn is absurd. But the idea that America needs government reform to maintain its lead in radical new technologies is surely right.

If Mr Trump truly wants to make America great, this is where his administration should focus. It would be ironic if the man who loves tariffs led the charge to accelerate technologies that may eventually reshape or replace many American jobs. But extending America's lead in AI would do far more to ensure its future prosperity and military security than any other part of the MAGA agenda. Over to you, Elon. ●

Reinventing the machinery of government could be the most important part of Mr Trump's agenda

Zanny Minton Beddoes Editor-in-chief,
The Economist

The MAGA scale of policy plausibility

A five-part guide to where Donald Trump will be constrained—and where he will not



THE 47TH president of America will be less constrained than the 45th president was, even though they are the same person. Donald Trump will enjoy more deference from his staff, his party and the courts than he did in his first term. That is not the same as saying there will be no constraints on him. Where can he be expected to get his way on his domestic-policy agenda in 2025—and where will he struggle?

While running for election, Mr Trump issued 20 headline policy priorities, backed by a 16-page document which goes into a little more detail. A practical way to think through presidential authority and constraints is to rank them on a five-point MAGA plausibility scale, from category five (certain to happen) down to category one (certain not to). In the coming year there will be intra-party battles between Republican factions. The courts will not let Mr Trump do whatever he wants. America's federal system delegates important powers to states and cities. And the clock is ticking, because the recent pattern has been that presidents who start with a trifecta go on to lose control of the House two years later. The interplay of these constraints will shape what Mr Trump can accomplish.

In category five—the dead certs—is the pledge to “make America the dominant energy producer”. That is because America, which produces more barrels of oil than any other country, is by that metric the dominant producer already. Job done! The same goes for the pledge to bring America “record levels of success”: on many economic measures America is already there. The promise to make its cities beautiful again is more subjective. But, with the possible exception of Houston (which has other charms), America's big cities are aesthetic marvels and will continue to be so in 2025.

Pledges that belong in category four—the highly likely—include those to scrap the electric-vehicle (EV) mandate and to cut costly regulation. The EV mandate was a Biden-administration executive order and therefore can be reversed by a Trump-administration executive order, with no need for legislation. The power to cut regulation resides in large part with the federal bureaucracy, which Mr Trump will slash, aided by Elon Musk. Also in category four is the pledge to keep the

dollar as the world's reserve currency. It is hard to see that changing over the next year, or four. The same goes for the promises not to cut Medicare or Social Security, or to raise the retirement age. Control of Congress should enable Mr Trump to extend his 2018 tax cuts: that is also highly likely in 2025.

In category three—the probable—is one of Mr Trump's biggest domestic-policy pledges: to sharply increase tariffs on imports. The policy platform does not put a figure on this: it merely says Republicans will support “baseline tariffs” on foreign-made goods. A universal tariff of 20%, which Mr Trump promised on the campaign trail, would probably need congressional approval, which is a constraint (see leader). Support for “baseline tariffs” is vaguer, though. Next, the promise to “keep men out of women's sports” will be hard to bring about. But the administration will issue an executive order banning the participation of trans girls in women's sport in schools and colleges that receive funding from the federal government.

In category two—possible, but less likely—is Mr Trump's other signature domestic promise: to “carry out the largest deportation operation in American history”. The recent total for the most people deported in a single year is held by Barack Obama's administration, which at its peak deported just over 400,000. A bit further back, Dwight Eisenhower's administration is thought to have deported just over 1m people in 1954 (it is hard to be precise because records from then are less complete). If that is the benchmark, it would be very hard to exceed it without cheating, for example by classifying someone turned away at the border as having been deported. “Sealing the border” will also be hard: irregular crossings were high during Mr Trump's first term until covid-19 closed the southern border. Attempts to deter migrants through extravagantly harsh policies, such as breaking apart migrant families, were stopped by Mr Trump after they were widely denounced as cruel. That is a constraint, too.

That leaves category one, the policies least likely to happen in 2025. Mr Trump's pledge to make college campuses patriotic again is, thankfully, doomed to fail. A patriotic university sounds like something that belongs in Beijing, not Boise. Students presumably love their country as much as other citizens do, but core to America's greatness is that they cannot be compelled to do so, least of all by the president. As for the promise to “restore peace in Europe and in the Middle East, and build a great Iron Dome missile defence shield all over our country—all made in America”: if President Trump is able to end the war in Ukraine without capitulating to Russia, and bring a durable peace between Israel and the Palestinians, he could leave a legacy that exceeds that of any president since Ronald Reagan. That is something to aspire to. ●

A practical way to think through presidential authority and constraints is to rank policies on a five-point scale

John Prideaux United States editor,
The Economist

If Europe wants peace, it must plan for war

But none of its major governments seems ready to face the future



THE SECURITY of Europe is entering a perilous and enduring decline. In 2025 Russia will have the upper hand in Ukraine. America, looking towards Asia under President Donald Trump, will become viciously transactional. Not since the 1930s have European leaders so urgently needed to summon the courage to face reality and the statesmanship to take action. Unfortunately, Europe's leaders are weak and distracted by their problems at home. Instead of standing up they are more likely to bury their heads deeper in the sand.

The danger begins in Ukraine. It comes not only from Russia's slow, relentless advance in the east—though, as the Ukrainian army is hollowed out, that looks ever more likely to cause the front to collapse. The real problem is that Russia's president, Vladimir Putin, knows the West has been unwilling to give Ukraine enough money or weapons to defend itself.

What is more, Mr Putin knows the West has failed to stop Russia, even though doing so would avoid the costly, dangerous alternative of defending the frontiers of northern and eastern Europe instead. He will rightly surmise that Europe is too weak-willed and complacent to face the changing geopolitical reality. If he concludes that he has more chances to disrupt NATO, his behaviour will become yet more aggressive.

The election of Mr Trump multiplies the threat. Ukraine has shown how much European security still depends on American hard power, 30 years after the end of the cold war. But the United States is globally over-extended and needs Europe to take more responsibility for its own defence. Even under a Democratic president, America's attention would have been drifting towards Asia.

Mr Trump will accelerate this process. Although unpredictability will be a central feature of his foreign policy, some of his beliefs are fixed. These include the idea that alliances are nothing more than contracts in which America provides security as a service.

No matter that America also gains from its alliances diplomatically and militarily, in ways that Mr Trump ignores. If America is to continue to back Europe, Mr Trump will want something tangible in return, whether on trade, military contracts or direct

payments. He could even do a deal with Mr Putin, over the heads of European leaders, to carve up Ukraine.

Either way, as members of an explicitly transactional NATO, European countries will no longer feel they can depend on America's cast-iron promise to fight alongside them if they are attacked. Mr Putin knows this, too, and that will be a further incentive for him to destabilise and attack the places to his west.

His motive is simple, but existential—at least in his eyes. After the collapse of the Soviet Union, Russia discovered that it could not thrive in the ordered, democratic, American-led world. The only way for Russia to claim its place as one of the great powers is to destroy the foundations of that order, including NATO, the European Union and the credibility of Western democracies. For Europe, therefore, the stakes are existential, too. You would never know it. Although frontier states feel the bear's breath on their necks, many others are absorbed in their own dramas.

It is hard to say which is in shorter supply: money or leadership. Germany, under the small-thinking Olaf Scholz, is tearing itself apart. In France a minority government survives at the behest of the pro-Russian Marine Le Pen, while the political classes position themselves ahead of the presidential election in 2027. An inexperienced Labour government in Britain is absorbed by fumbling efforts at domestic reform.

None of them is ready to face the future. The possibility of Mr Trump's return has long been clear, but Europe has been unable to draw up a coherent plan if he pulls the plug on Ukraine, as he has threatened to. Though Brussels will redirect a chunk of EU money to defence, Europe has suffered persistent shortages of arms, despite warnings that its defence industry is underpowered. National budgets will have to rise, too.

The task of making Europe safe is immense, and will take years. All the more reason to start work now. Leaders must be clear to their people about the dangers ahead, starting with the idea that Russia wants to destroy the EU and NATO, not just Ukraine.

Another requirement is for European countries to forge a common front. Both Mr Putin and Mr Trump will strive to divide them. For Mr Putin division is an end in itself; for Mr Trump it is a means to undermine Europe's leverage in negotiations. Britain's departure from the EU is an obstacle to industrial mobilisation. But it is a member of NATO and the Joint Expeditionary Force, a northern European partnership.

The last requirement is to start building a deterrent to Mr Putin. Europe needs larger armed forces. They need to be equipped by a defence industry with greater capacity. They need a command structure, in case Mr Trump refuses to let America fight. It will not come cheap. Europe has been unable to muster enough will-power to prevent a Ukrainian defeat. In 2025, does it have the resolve to avert something even worse? ●

It is hard to say which is in shorter supply: money or leadership

Edward Carr Deputy editor, *The Economist*

America's deterrence deficit

The gap between the threats the world faces and American power will become stark



AS THE TRUMP administration takes office in early 2025 the world will be in its most dangerous state since the cold war. The contest between America and China will loom large, two regional wars will be burning, a zone of anarchy in Africa will be expanding, the observance of global laws will be in decline and four autocracies—China, Russia, Iran and North Korea—will be tightening their pact to undermine Western power. As the Biden administration departs it will also be clear that America is alarmingly overstretched, with the strains being visible in everything from low missile stocks to creaking sanctions enforcement.

This gap between a more anarchic world and America's limited power to influence it will be a far bigger feature of President Donald Trump's second term than it was in his first. In some cases he will be indifferent to it; in others he may believe he can deploy his brand of muscular threats and dealmaking to fix problems. But his isolationist instincts will stop him from enacting the policies needed to enhance American power in the long run. And the shortfall in American clout may trigger frustration, leading him to embrace quick-fix brinkmanship, capitulation and a shedding of responsibilities that ultimately weaken America's position and accelerate the chaos.

The world wasn't meant to look like this. For years the dominant force was said to be the Sino-American rivalry, sometimes called the "Thucydides trap". This rivalry is as intense as ever, and in some respects the Biden administration handled it well by building up Asian alliances. But the huge surprise has been the roiling violence elsewhere. Casualties in the Ukraine war could reach 1m by the end of 2025. Iran's scheming and the havoc in Gaza and Lebanon threaten instability in the Middle East for yet another generation.

Compared with the start of Mr Trump's first term in 2017, more of the world operates in a grey zone: think of Sudan's epic civil war or booming oil-smuggling. In a game-changing shift, the four autocracies are collaborating in drones, intelligence and sanctions-busting. They are pushing boundaries. In the final weeks of America's electoral race, China simulated a blockade of Taiwan and North Korea made nuclear threats and

sent troops to Russia. This cocktail of local wars and alliances is familiar to students of the two world wars.

Of course, some of the explanation for a more dangerous world lies with factors far beyond America's control, including the morphing ideologies of autocrats and the rise of new economic powers. But Mr Trump and his advisers are also right to blame waning deterrence. There is a perception that America is wary of unleashing overwhelming hard power: consider the dribble of weapons to Ukraine or the struggle to police the Red Sea. Resources are stretched. There are too few shells to resupply allies, scarce air-defence batteries are being shuffled between hotspots and at one point in August there were no aircraft-carriers in the Pacific. If the autocracies collaborated more, for example on nuclear weapons, the gap would get worse.

If you were to prepare a briefing on American power for President Trump on January 21st 2025, complete with pictures, you could argue that the deterrence gap is a solvable problem in the long run. America's share of global GDP is 26%, or 58% including its allies, almost the same as in 1987 when Paul Kennedy, a historian, warned it would eventually stumble under its military burden. It hosts about half of all leading AI models. The four autocracies will face succession crises and are struggling with lousy productivity; China and Russia have shrinking populations, too.

Mr Trump may embrace some long-term policies that build up American power, such as a retooling of its defence industry and higher military spending. But the problem is that his isolationism and protectionism will undermine America's alliances. Instead the Trump administration will explore unorthodox and sometimes shocking quick fixes. His more extreme advisers will recommend making far more aggressive use of limited resources: should America make more nuclear threats (as Dwight Eisenhower did in the 1950s), or consider preventive attacks, for example on Iran, or encourage allies such as South Korea to build nuclear weapons? Other advisers will recommend that he shrinks the number of problems by abandoning more of America's commitments. That includes pushing for peace in Ukraine. Mr Trump may even try to split the autocracies, as America did with the Soviet Union and China. Separating Vladimir Putin from Xi Jinping would be the ultimate deal.

In a more dangerous world President Trump's desire for disruption and capacity to intimidate will have uses. Yet his brinkmanship, inconsistency and vulnerability to being played by opponents will cut against his aim of pursuing "peace through strength". The long-term restoration of American power requires investment and alliance-building that he will probably be unable or unwilling to do. The deterrence gap is growing, and in 2025 the world will find that even Mr Trump is not a big enough figure to close it. ●

The Trump administration will explore unorthodox and sometimes shocking quick fixes

Patrick Foulis Foreign editor, *The Economist*

Will “tariff man” get his way?

Donald Trump’s explosive trade plan could cause global damage—but he will struggle to implement it all



ALMOST A CENTURY has elapsed since America’s Congress last passed a bill into law levying tariffs on imported goods. The Smoot-Hawley Tariff Act of 1930, which raised average tariffs on imports by around 20% and incited a tit-for-tat trade war, was devastatingly effective: global trade fell by two-thirds. It was so catastrophic for growth in America and around the world that legislators have not touched the issue since. “Smoot-Hawley” became synonymous with disastrous economic policymaking.

With Donald Trump re-elected as America’s president, history threatens to repeat itself. On the campaign trail he promised to levy tariffs of 10-20% on all goods imported across America’s borders—with levies of as much as 60% on imports from China, and 100% on those from Mexico. Many economists have tried to estimate the possible impact on growth and inflation. All have concluded that such sweeping tariffs would harm growth and push up prices.

The Peterson Institute for International Economics, a think-tank, reckons a 10% universal tariff increase and retaliation from trade partners would knock one percentage point off America’s growth for the two years after its introduction, and continue to impose a drag on growth indefinitely. Trading partners such as China and Mexico would also take sizeable hits. UBS, a bank, has already downgraded its Chinese growth forecast for 2025 to just 4.0% from 4.5%. The big questions now facing America, and the rest of the world, are whether Mr Trump really intends to go ahead with this plan—and, if so, whether he will be able to.

Start with the more quixotic question of whether Mr Trump really means it. Only he knows the answer. But plenty of his economic advisers have argued that his threats of huge tariffs are simply a bargaining tactic—and that he does not actually want to impose such sweeping measures. The trouble with this logic is that it is all too familiar. The same argument was made during Mr Trump’s first campaign about his promises to “build the wall” (supposedly just a metaphor) or introduce a “Muslim ban” (an exaggeration).

In fact, he was serious about both—so Mr Trump may well be just as serious about his trade agenda, too.

Analysts have concluded that sweeping tariffs would harm growth and push up prices

Robert Lighthizer—a hardliner on trade issues, and an advocate of tariffs—appears to be in contention for various important roles in the next Trump administration. Having led Mr Trump’s trade efforts the first time round, he would be ready to hit the ground running.

What about the more concrete question of whether Mr Trump will be able to implement his plan? He can certainly impose some tariffs. He did so during his first term, on things like steel and aluminium, under the broad powers ceded by Congress that allow the president to take action during emergencies or to protect national security.

Yet the most sweeping version of Mr Trump’s trade plans would surely exceed the limits of those powers. The inevitable legal challenges that would result mean the plan would probably end up in the Supreme Court. Whether the justices would allow such broad tariffs to stand is unclear, but it is not a certainty. So imposing universal tariffs would probably require getting Congress to pass legislation.

A standalone tariff bill is probably out of the question. Mr Trump will also be working with a razor-thin margin in the House of Representatives, where there are plenty of Republicans (although not nearly as many as there once were) who do not support an anti-trade agenda. If a bill did make it through the House it could avoid filibustering in the Senate by being passed as a budget bill, through a process called reconciliation. But that process can take place only once each fiscal year, and has become the main avenue through which all policymaking gets done.

As such, whatever bill tariffs might end up in would probably encompass a smorgasbord of Mr Trump’s economic policies—including an extension of the tax cuts he implemented in his first term and the repeal of some of the environmental subsidies put in place by President Joe Biden. The advantage of including tariffs in such a bill would be that they could raise revenue to offset that lost through tax cuts. But cleanly bundling up an extreme trade agenda with so many other competing priorities would be hard. Some tariffs could no doubt be included, but not the sweeping measures mooted during campaigning.

That Mr Trump might face political constraints on his trade policy perhaps explains the reaction of markets. Investors are certainly expressing concern about the impact on some countries: the Mexican peso has had a pretty torrid year, falling by around a fifth against the dollar, even as the greenback sits at roughly the same level, against a basket of global currencies, it was a year ago. But overall, investors seem to be shrugging off the potential threat to growth that drastic tariffs would pose. American equities jumped by 2.5% the day after Mr Trump won re-election, and have continued to climb since. Is that too optimistic? The world will find out in 2025. ●

Alice Fulwood Wall Street editor, *The Economist*

The coming border crackdown

America will not be the only country trying to curb migration in 2025



VOTERS EVERYWHERE are fed up. In all the big countries that held elections in 2024, the incumbent party lost seats. Complaints varied, but two stand out. One was high prices (partly a consequence of pandemic-era largesse). The other was migration, which surged after covid-19 border controls were eased. A sense that governments had lost control in both areas spurred voters to punish them in America, Britain and France in 2024, and hastened the collapse of Germany's ruling coalition. In 2025 some leaders will try to reduce economic and cultural turbulence for citizens by shutting out foreigners. The most dramatic experiment will be in the United States. How it pans out will have global consequences.

Blaming immigrants for stealing Americans' jobs and "poisoning" the nation's blood, President-elect Donald Trump vows to round up and deport all those in the country illegally. The economic effects would be grim. If he deports only 1.3m irregular workers (out of an estimated 8.3m), America's economy will be 1.2% smaller than expected by 2028; if he throws them all out, it will be a stunning 7.4% smaller, according to the Peterson Institute for International Economics.

If mass deportations are combined with Mr Trump's proposed tariffs, thus simultaneously choking the supply of imported labour and goods, the damage will be even worse: an economy anywhere from 3% to 10% smaller than expected by 2028, and cumulative inflation 13-23% higher. Also, by another estimate, every 100 deportations will reduce the number of jobs for the native-born by 8.8.

Mr Trump's plans are costly and legally questionable, but he will not need Congress to give him extra funds or authority. Instead, his advisers say he will revive emergency powers he wielded during the pandemic. Covid-19 may be gone but there are plenty of other diseases that immigrants might, in theory, carry—and the new president may use this as a pretext to end asylum. Building huge detention camps for migrants would be expensive, but Mr Trump could divert some of the Pentagon's budget, spuriously claiming to be defending America against an invasion.

The main checks on him will be practical and polit-

ical. Wholesale deportation would require the co-operation of law-enforcement agencies in states and cities run by Democrats. This will not be forthcoming, and unlawful migrants will seek sanctuary in such places. Public support for expulsions may plummet if it means tearing families apart—more than 11m American citizens live with a relative who may be subject to removal. Specific industries, from fruit farms to hotels, will lobby furiously if their businesses are threatened by a labour shortage. So Mr Trump will surely stop short of the most extreme version of his plan.

Across the rich world, asylum rules will grow tighter in 2025. Italy's attempt to process claims in a third country, Albania, has run into legal troubles, as did Britain's similar scheme, in Rwanda, before it. But the notion that asylum-seekers should seek refuge in the first safe country they reach, rather than keep moving until they find a rich country, will gain currency. Mr Trump's team talks of holding would-be migrants in camps in Mexico or Africa, in the hope of deterring many from setting off in the first place.

Irregular migrants will dominate the headlines. But many on Mr Trump's team are also keen to curb legal migration, even of highly skilled people. This will dull America's extraordinary dynamism: by one estimate, immigrants are 14% of America's population but generate 36% of innovation. If Mr Trump makes legal immigration even harder than it already is, he will create an opportunity for other places, from Dubai to Switzerland, to poach the talent America spurns.

With large swathes of the world growing more hostile to foreigners, the advantages of selective openness will increase. Smart governments should trumpet how quickly they issue visas to high-achievers, and woo talent not just from America but from all "drawbridge up" countries, including China and Russia.

For policymakers in all rich countries, a smart immigration policy will involve striking a balance. Governments must show voters that they are in control of who is let in, and that newcomers must pay their way. Only then will voters consent to inflows sufficient to ease skills shortages, rejuvenate ageing workforces and prop up pay-as-you-go pension systems. Japan, which is ageing and shrinking faster than most, has quietly decided to admit an extra 800,000 foreigners over the next five years, in areas from nursing to construction work. There is little backlash; the jobs need doing and few Japanese want to do them. Other rich, ageing countries should pay attention.

Covid-19 showed that governments can close borders tightly if they choose to do so—and that the cost of doing so is high. If Mr Trump imposes comparable restrictions on America when there is no pandemic, he will make it less rich, less innovative and less humane. Other leaders should not copy him. But some undoubtedly will. ●

For rich countries, a smart immigration policy will involve striking a balance

Robert Guest Deputy editor, *The Economist*



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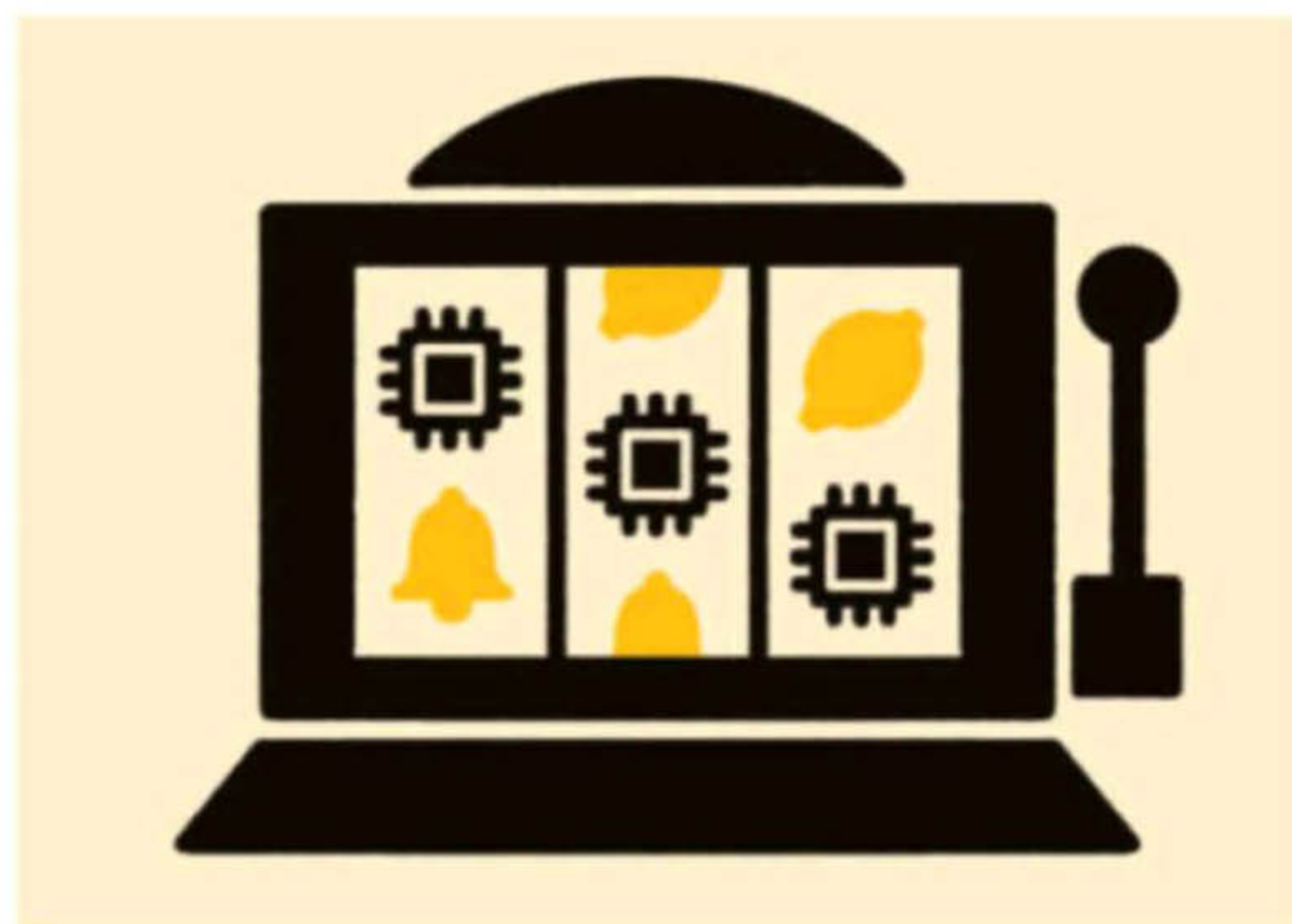
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European Equity Research

Emmanuel Cau
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Equity Strategy

Crunch time for AI

Will the AI bubble burst, or will the technology finally start to deliver real value?



IT MAY BE the biggest gamble in business history. Today's mania for artificial intelligence (AI) began with the launch of ChatGPT at the end of November 2022. OpenAI's chatbot attracted 100m users within weeks, faster than any product in history. Investors also piled in. Spending on AI data centres between 2024 and 2027 is expected to exceed \$1.4trn; the market value of Nvidia, the leading maker of AI chips, has increased eight-fold, to more than \$3trn.

And yet most companies are still not sure what the technology can or cannot do, or how best to use it. Across the economy, only 5% of American businesses say they are using AI in their products and services. Few AI startups are turning a profit. And the energy and data constraints on AI model-making are becoming steadily more painful. The disparity between investor enthusiasm and business reality looks untenable—which means 2025 is shaping up to be a crunch year. The race to make AI more efficient and more useful, before investors lose their enthusiasm, is on.

Start at the cutting edge of innovation. Several constraints are slowing the pace at which the technological frontier is being pushed out. Training big models needs huge amounts of energy. The electricity used to train GPT-4, the large language model underpinning ChatGPT, could have powered 5,000 American homes for a year; the equivalent figure for GPT-3, its predecessor, was 100. Developing ever larger and whizzier models thus requires ever deeper pockets. By some estimates, the next generation of models could cost \$1bn to train; and the larger they become, the more the cost of querying them (known as "inference") will mount. Meanwhile, there is a looming shortage of training data. By one estimate, the stock of high-quality textual data on the internet will have run out by 2028.

Companies around the world are rushing to come up with clever fixes to these problems, from more efficient and specialised chips to more specialised and smaller models that need less power. Others are dreaming up ways of tapping new high-quality data sources such as textbooks, or generating synthetic data, for use in training. Whether this will lead to incremental improvements in the technology, or make the

next big leap forward affordable and feasible, is still unclear. Investors have poured money into superstar firms like OpenAI. But in practice there is not much difference in performance and capabilities between the flagship models offered by OpenAI, Anthropic and Google. And other firms including Meta, Mistral and xAI are close behind.

For end users of AI, a different kind of struggle is under way, as individuals and companies try to work out how best to use the technology. This takes time: investments need to be made, processes rethought and workers retrained. Already some industries are further ahead in adopting AI than others: a fifth of information-technology firms, for instance, say they are using it. As the technology becomes more sophisticated—such as with the arrival in 2025 of "agentic" systems, capable of planning and executing more complex tasks—adoption may accelerate.

But culture also matters. Although few firms tell statisticians they are using AI, one-third of employees in America say they are using it for work once a week. In some roles the figure is even higher. One study found that 78% of software engineers in America are using AI at least weekly, up from 40% in 2023, as are 75% of human-resources staff, up from 35%. And OpenAI says 75% of its revenue comes, tellingly, from consumers rather than from corporate subscriptions.

All of this suggests that much use of AI is in secret, as workers use it to streamline tasks such as rewriting text or generating reports. Employees may worry that if they admit to using AI to get things done more quickly, bosses will give them more work to do, or take this as a signal that fewer workers are needed. This in turn suggests that AI adoption is as much a management challenge as a technological one. To get the most out of the technology, bosses need to create an environment that incentivises openness and experimentation, rather than secrecy and suspicion.

And AI can be used for more than office pencil-pushing. It may be that, in 2025, the most prominent AI breakthroughs come in other areas, such as drug development (the first AI-derived drugs may go into stage-three clinical trials) or defence (as intelligence is added to drones, which are emerging as key weapons systems of the future). Indeed, the West worries that China will harness AI to gain a military and economic advantage. Ironically, Chinese engineers have become particularly adept at innovating around resource constraints, in part because American export controls have curtailed their access to cutting-edge AI chips.

The AI race, then, will take many forms in 2025. Yet the point at which investors lose their nerve is often when new technologies quietly start gaining traction. Will the bubble burst, or will the technology start to deliver? The answer in 2025 may be: a bit of both. ●

It seems that much adoption of AI is in secret, as workers use it without telling their bosses

Rachana Shanbhogue Business affairs editor,
The Economist

A place to talk about cooling the Earth

The secretary-general of the UN is in a unique position to start a conversation about geoengineering



PROJECT POPEYE was an attempt by America to vanquish its Vietnamese enemies using cloud-seeding techniques to wash out their supply lines. It didn't work. But a few years after the fact, in 1977, it did bring about a treaty aimed at stopping others from following suit. The "Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques", normally known as ENMOD, prohibits countries from deliberately using "environmental modification techniques having widespread, long-lasting or severe effects" to harm each other.

Given that no countries have since done deliberate harm to others in this way, ENMOD can perhaps be counted a success. That, though, would be to confuse effectiveness with irrelevance, given that no countries have shown any serious evidence of wanting to break its strictures. The last time its signatories got together to confer was in 1992.

The time has come for them to think about gathering again. Environmental modification with "widespread, long-lasting and severe effects" is one of the most striking features of 21st-century life. The greenhouse-gas-driven climate crisis is not the sort of thing ENMOD was conceived to deal with. But the treaty might still play a useful role in addressing it.

Although 2025 is quite unlikely to be the hottest year on record—as 2023 was and as 2024 will prove to have been come January—it is still likely to be hotter than every year in every previous decade on record. More alarmingly, it is also set to be one of the coolest years for decades to come. There is welcome progress in reducing emissions in many countries. But what matters to the climate is not the rate of emissions, but the cumulative total. Until that stabilises, all other things being equal, temperatures will continue to rise.

However, all other things do not have to be equal. Solar geoengineering is another form of environmental modification. It would cool the planet by reflecting incoming sunlight back into space before it can do any warming. Research suggests that injecting shiny particles into the stratosphere might be a quite feasible way of doing this, and thus possibly slowing or stopping the rise in temperatures over much of the world.

Consider the consequences of choosing not to explore the possibility

It sounds like the very definition of hubris. It would have physical, chemical and biological effects well beyond those on temperature, changing the hydrological cycle, the chemistry of the upper atmosphere, even conceivably the rate of photosynthesis. Its indirect effects on human affairs might be yet more worrying. Such schemes would be easier to add to than to counteract, so the level of modification the world would see would probably be the level chosen by the country with the greatest appetite for such modification—unless others intervened by diplomacy or force. Many might also take this as an opportunity to ease off on emissions reduction, thus increasing the amount of solar geoengineering which might be called for, and doubling down on the risks that would come with it.

But then consider the consequences of choosing not to explore the possibility. At least four or five more decades of rising temperatures, maybe more; more deadly heatwaves in places that have rarely seen such things; deadlier heatwaves in places all too used to them; more droughts and crop failures; more glaciers melting; more extreme rainfall and flooding; more of the lower productivity associated with high temperatures blighting more developing-world economies; more people forced to move from places becoming more or less uninhabitable. More suffering.

There is no easy way to discuss such choices, and no obvious place for such discussions. The UN Framework Convention on Climate Change was not designed with solar geoengineering in mind, and has shown no interest in adapting itself to the task. But the ENMOD convention might provide an alternative.

Its main purpose is to prevent malicious environmental modification, but the 78 states party to it are also committed to "international economic and scientific co-operation in the preservation, improvement, and peaceful utilisation of the environment, with due consideration for the needs of the developing areas of the world". That is as good a starting place for discussing geoengineering and its prospects as any that international law has to offer.

A handful of parties to ENMOD could start setting up a meeting to discuss how they might think about, avoid or govern geoengineering tomorrow. Alternatively one man could get the ball rolling on his own: António Guterres, secretary-general of the United Nations. He inveighs passionately against the growing impacts of climate change, proclaiming in 2023 that "the era of global warming" had been replaced by "the era of global boiling". But all he offers to counter the apocalypse he describes is a new urgency about emissions reductions, which will have no effect for decades. If he wants countries to think seriously about the risks and potential of acting to cool the world, he should set the table for them. ●

Oliver Morton Senior editor, *The Economist* and chair, The Degrees Initiative

Age limits and democracy

Imposing a maximum-age limit on elected politicians may seem sensible, but would be illiberal



THE AMERICAN presidential election of 2024 was groundbreaking in many ways, not least in its elevation to the highest office, for the first time, of a convicted felon. But it established another precedent too: that age is a consideration when running for president. American voters, Democratic Party powerbrokers and eventually President Joe Biden himself concluded that 81 was too old to run for another four-year term. Does it make sense for democratic societies to enshrine such limits into law?

Serving into old age is often a mark of politicians' dedication as public servants. Yet age limits are applied to workers in other professions that carry a heavy burden of responsibility. Airline pilots in America and the EU must stop working at 65. Firefighters and police in many countries retire at 60 or earlier. Americans must leave the armed forces before they turn 64.

Governments also restrict the rights of citizens to do all sorts of things as they get older, especially if those activities could pose a danger to other people. Many European countries require drivers to take medical tests at regular intervals after the age of 70 in order to keep their licences. Finland requires medical tests for driving-licence applicants aged 45 or higher. England imposes an age limit for serving on a jury. Sitting in judgment of one's peers or steering a tonne of metal and glass at 60mph is no small responsibility. Nor is running a country, state or district.

Meanwhile, the average age of world leaders is increasing—it has risen from 55 to 62 over the past five decades, according to our analysis (see International section). And it is not just presidents and prime ministers who are getting older. On Capitol Hill, two-thirds of America's senators and half of its representatives were born before 1964. No doubt many are robust, but not all: 11 lawmakers have died in office since 2020. Half of them were over 80. Supreme Court judges are also appointed for life, rather than serving until a designated age, or for a fixed tenure.

Every democracy sets a minimum age for holding office. Some, such as France, are exceptionally liberal, allowing 18-year-olds to run for president, a position with near-monarchical powers. Others are more cir-

cumspect. Italy's president must be at least 50, even though the position is largely ceremonial. But no country sets an upper age limit for wielding power. Should they? Wisdom and experience count for a lot. But so do vitality, dynamism and fresh ideas.

North Dakota is leading the charge: in June its voters approved a measure that sets a maximum age for representing the state in Congress (candidates are barred from running if they would turn 80 during their term). More widely, both Republicans and Democrats favour age limits for politicians and Supreme Court judges by overwhelming majorities, according to a survey by the Pew Research Centre. In Britain, the governing Labour Party has promised to impose a retirement age of 80 on members of the House of Lords, who are appointed for life. And India's ruling Bharatiya Janata Party imposes an age limit of 75 on candidates standing for office, though it is not rigidly enforced.

It may sound reasonable for democracies to adopt age limits for those seeking elected office. But to do so would set a dangerous precedent. In a free society both the electorate, and the candidates they vote for, should be as broadly representative as possible. That means placing as few restrictions as possible on who can vote and whom they can vote for. The more governments impose limits on who can stand, the greater the danger that such limits will be subject to political meddling. Better just to let voters decide. The bar to imposing an age limit should thus be very high.

Moreover, according to our analysis there is no need for it. That is because even though the average age of world leaders is rising, in democracies (as classified by the Economist Intelligence Unit, our sister organisation) it is falling. The average age of democratic leaders has fallen from 59.4, for the period between 1975 and 1985, to 58.2 for 2015-25. In the OECD, a club of mostly rich countries, the equivalent figure fell from 59.0 to 55.7. In 1975 no country had a freely elected leader under 45, but now (as *The World Ahead 2025* goes to press) three of them do: Chile, Ireland and Guyana. In most free countries, in short, the age of leaders is neither a significant nor a growing problem.

The notable outlier to this trend is America. But that is due to the fact that many aspects of its democratic system favour incumbency and seniority. Gerrymandering of electoral districts also ensures that many races are uncompetitive, allowing incumbents to keep their seats for decades. America's political gerontocracy is a symptom of deeper problems, not the cause of them. A maximum-age limit would simply mask these problems, rather than fixing them.

As Donald Trump, aged 78, returns to the White House, the global debate about political age limits seems likely to intensify in 2025. Autocrats would, by their nature, ignore such restrictions. Democracies should think very carefully before imposing them. ●

America's political gerontocracy is a symptom of deeper problems, not the cause of them

Leo Mirani Asia correspondent, *The Economist*

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Superforecasters

Predictions, provided

Forecasts for key events in 2025, from the superforecasters at Good Judgment

JOURNALISTS AND commentators often make predictions about the future using ambiguous, carefully chosen words. Some other forecasters, however, prefer to express their prognostications using the rather more precise language of numbers and probability distributions.

Good Judgment, a forecasting firm, has recruited many such people to its team of professional superforecasters, who work together to provide detailed, specific forecasts. Here are their predictions for some key events in 2025.

↓
Will Russia and Ukraine announce a ceasefire with an intended duration of at least 28 days before October 1st 2025?



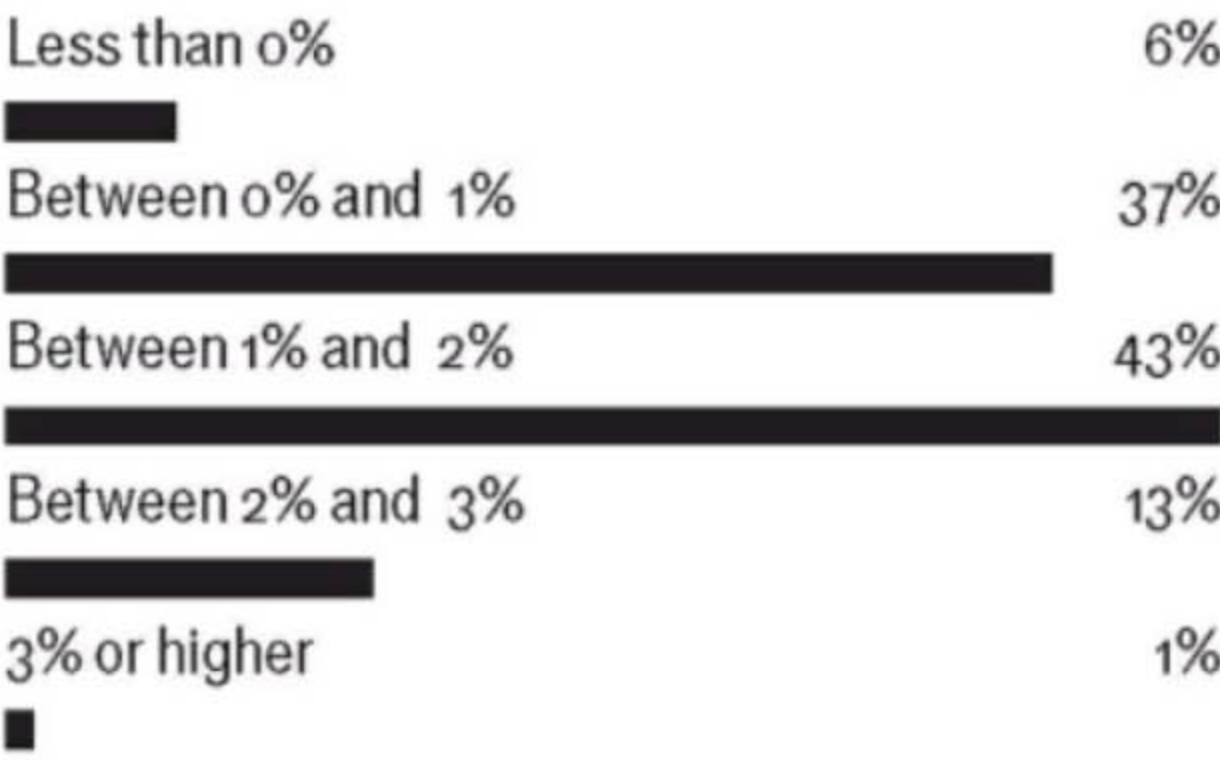
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What will Nvidia's market capitalisation be on December 31st 2025?



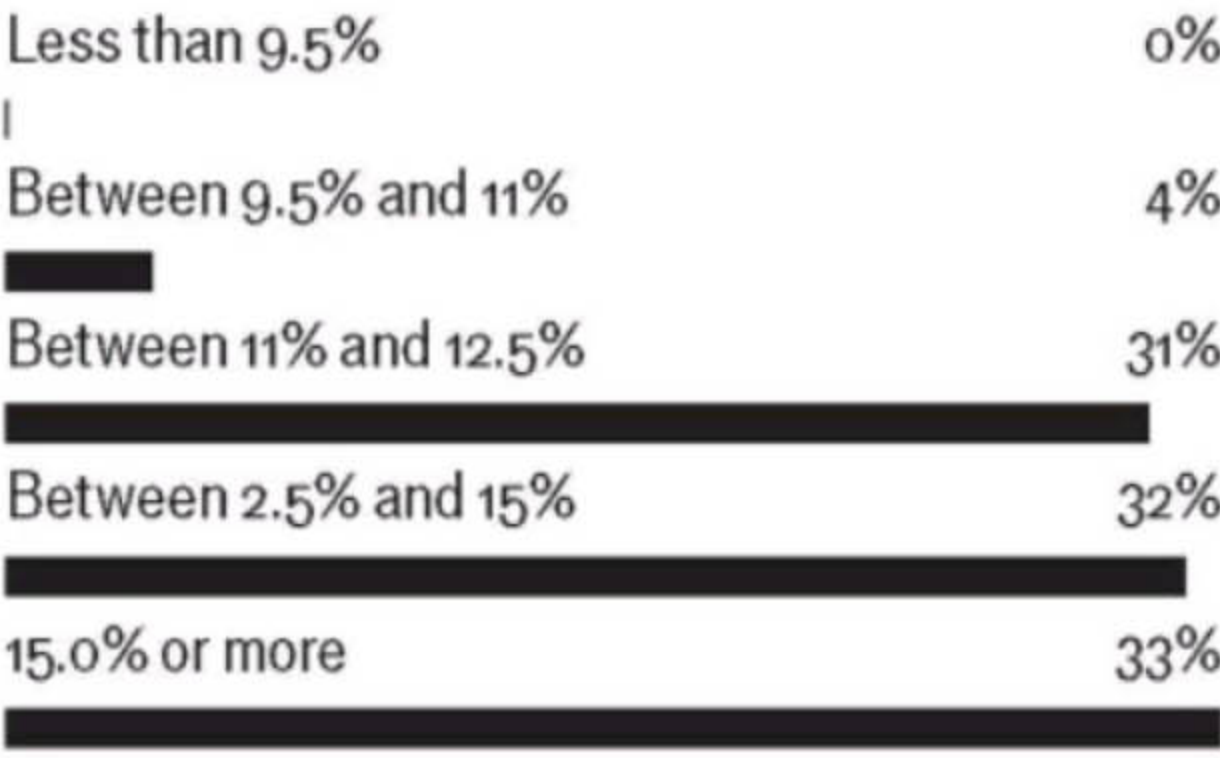
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Will Min Aung Hlaing or his military successor cease to be the leader of Myanmar before October 1st 2025?



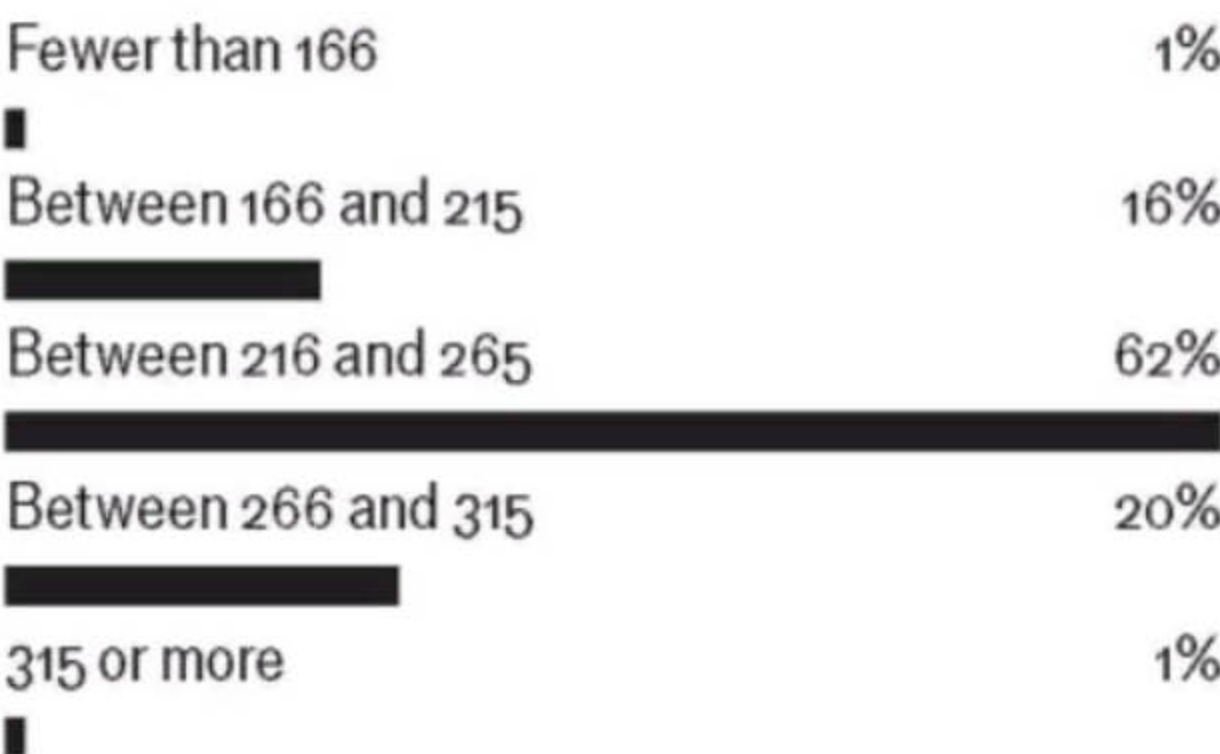
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What will China's annual inflation rate for 2025 be?



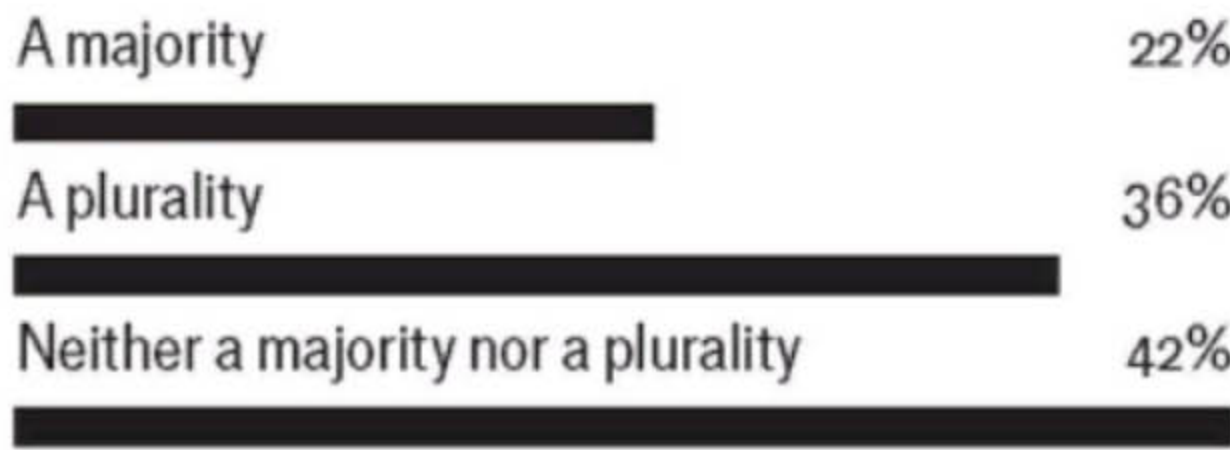
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What will be the effective US tariff rate for Chinese imports in the second half of 2025?



↓
How many Bundestag seats will the Christian Democratic Union /Christian Social Union (CDU/CSU) win in the next German federal election?



↓
How many seats will the Liberal-National Coalition win in the next Australian House of Representatives elections?



↓
How many seats will the Conservative Party win in Canada's next federal parliamentary election?



↓
Will NASA's Artemis 2 mission be launched successfully before January 1st 2026?



Forecasting winner
Congratulations to Daniel Nilsson, a data scientist based in Sweden, who has won **The World Ahead 2024 forecasting challenge**, run in collaboration with Good Judgment. A new forecaster, he is well on his way to being invited to join the super-forecasting team, like previous winners. **Could you be a superforecaster, too?** Enter our 2025 challenge, which runs until October 2025, at gjopen.com/economist



LAST YEAR'S PREDICTIONS

The superforecasters scored 4.5/8 with their forecasts for 2024, correctly calling China's sub-5% GDP growth, Britain's election, continued conflict in Ukraine, no clash between China and a Quad power, and no euro-

zone recession (though they expected one quarter of contraction, so they were only half right). But global GDP growth outpaced their forecast of 1.5-3%; they said Narendra Modi's alliance would win at least 300 seats in India's election (it won just 240); and they wrongly predicted a Democrat would win the US presidency.

United States



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The sequel is usually worse

What to expect after Donald Trump's second electoral victory

Idrees Kahloon Washington bureau chief,
The Economist

THE FIRST time Donald Trump won the presidency, in 2016, by beating back both the Republican and Democratic establishments, was shocking. That he won it again in 2024—after losing in 2020, inciting his supporters to try to violently overturn his loss, then keeping control of his party while weathering 90 or so felony indictments (with convictions on 34 of those counts), two assassination attempts and one switch-up at the top of the Democratic ticket—is utterly surreal. Only one previous president, Grover Cleveland, managed to return to the White House after being

booted out once. That was more than a century ago.

Most presidents who return to office do so without unified party control of Congress. But Mr Trump has been graced with a trifecta, with Republican majorities in both the Senate and House of Representatives. This gives him, once again, the chance to pass legislation rather than merely flexing the powers of executive authority. His victory also brings relief from the lawsuits that have dogged him. And he will be tempted to seek retribution against his political enemies.

Mr Trump squandered much of his political capital in 2017 pursuing a repeal of the Affordable Care Act, known as Obamacare. His signature achievement, actually shepherded by his congressional allies, was a major tax cut known as the TCJA. Many of the important provisions of that bill will expire at the end of 2025, requiring a new bill to either extend or revise them. Mr Trump has pledged a variety of tax giveaways which would collectively cost trillions over the coming decade if enacted. All this will need to be resolved in the giant tax bill to come. Mr Trump may look to cut clean-energy spending, approved by Democrats, as a way to fill some of the revenue gap.

It will not be a comfortable time to be a bureaucrat. Mr Trump's animosity towards the "deep state" has hardened in his time away from power; his allies have prepared plans to eliminate those they consider to be conspirators and doubters. He will use his executive fiat to overturn Joe Biden's executive orders on environmental limits. He will issue sweeping executive orders on immigration, aiming to "shut down" the

▶ southern border and limit asylum.

Having pledged sweeping tariffs on China, Mr Trump will be swift to show he means business, perhaps by invoking national-security authorities to implement them without specific congressional approval. All this will be challenged in court.

For all the storm and stress about Mr Trump's return at home, his first year could be even more consequential abroad. Under Mr Biden, America was one of the chief sponsors of Ukraine's defence against Russia's invasion. Mr Trump pledged to settle the conflict after his election, even before he was inaugurated. Further military aid from America is unlikely to be forthcoming, pushing more of the burden onto the Europeans.

Although Mr Trump is hesitant about traditional war, he is keen on trade wars. So he is likely to intensify

**It will not be
a comfortable
time to be
a bureaucrat**

Mr Biden's policy of export controls on sensitive materials, such as the advanced chips used for artificial intelligence, alongside a bevy of new, punitive tariffs.

This will be Mr Trump's final term in office. He may consider what his legacy will be, beyond just beating his political enemies at home and disengaging abroad. After remaking the Republican Party from within—into a nativist, protectionist party, sceptical of military adventurism and indeed of broader American involvement overseas—his victory ensures that this ideological transformation will be enduring. J.D. Vance, the new vice-president, aged 40, is the heir apparent to the Make America Great Again movement that has taken over American conservatism, provided he can stay in Mr Trump's good graces. Wherever Mr Trump takes America in the next four years will be felt for decades to come. ●

What now for the Democrats?

The way forward is far from clear

James Bennet Lexington columnist,
The Economist

LEFT TO THEIR own devices, American political parties are weak, befuddled things. When they wind up in the political wilderness they tend to wander, muttering to themselves, until some new leader—a Ronald Reagan, a Bill Clinton, a Donald Trump—comes along to supply direction. In blazing the Republicans' path back to the White House, Mr Trump has sparked a frenzy of finger-pointing and even some soul-searching within the Democratic party that will continue throughout 2025 and beyond. The Democrats can at least console themselves that they have a strong generation of rising politicians from outside the Beltway who are, at last, free to compete to set the party's direction.

President Joe Biden's disastrous decision to seek re-election, despite concerns about his age, prevented that competition from happening when it might have produced a candidate and agenda strong enough to defeat Mr Trump. Kamala Harris ran a creditable campaign once Mr Biden dropped out, but she is unlikely to reclaim the nomination. So there is no Democratic frontrunner—and no Democratic leadership with the authority or credibility to anoint one.

Nor is there agreement on policy or message. The need to contend with Mr

Trump's overhaul of the Republican party will complicate the Democrats' debate over whether the winning path nationally lies further left, or towards the centre. The pro-labour economic populism of the party's leftists may appeal to working-class voters who defected to Mr Trump, but those same people are alienated by leftist positions on policing, illegal immigration and transgender rights.

For now, it will fall to the Democrats' congressional leaders—Hakeem Jeffries in the House and Chuck Schumer in the Senate—to counter Mr Trump. That means the Democratic agenda will be defined by opposition to his initiatives. Even that agenda may not cohere, because Mr Trump and his policy are whatever he says they are, day to day. His endless shape-shifting will keep Democrats off-balance.

The last time Democrats had an open competition for their nomination, in 2019 and 2020, the party lurched to the left. It

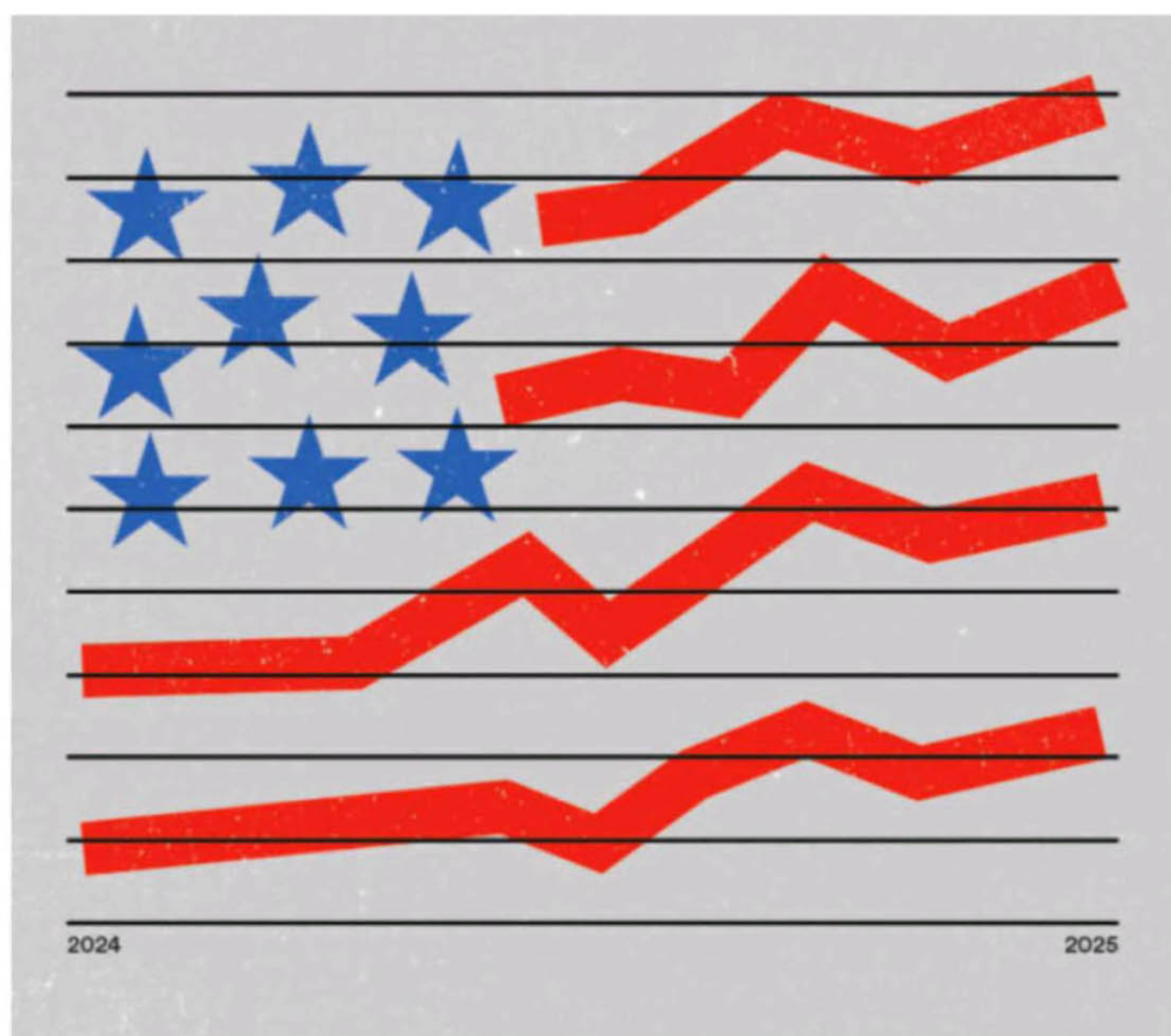
was the febrile season of covid-19 and Black Lives Matter. Ms Harris came to regret some of the positions she took. Now the dynamics will be different. Some sensible candidates from 2020 will be contenders again. But the buzz in 2025 will be loudest about governors in their 40s and 50s who will compete on records of pragmatic decision-making.

Gretchen Whitmer of Michigan and Josh Shapiro of Pennsylvania are proven vote-winners with working-class people in battleground states. Andy Beshear of Kentucky has won handily, twice, in a state Mr Trump carried three times. Wes Moore was elected as Maryland's first black governor in 2022 with 64.5% of the vote.

But until the 2028 campaign gets going, no one will be sure what the Democrats are, except not-Trump. In 2020 Mr Biden called himself a "bridge" to the future. He has left his party with no map, or any idea whom to trust to find a way forward. ●



↑ No garbage jokes, please



Trump's rich inheritance

America's economy enters 2025 in great shape. Politics will not spoil it—yet

Simon Rabinovitch US economics editor, *The Economist*

IT IS NATURAL to assume, with Donald Trump back in charge, that America's economic outlook for the coming year will depend on his agenda and his whims. But when thinking about how the economy might fare, it is best to start by leaving politics aside.

America enters 2025 with impressive momentum. Not long ago the consensus prediction of analysts was that it would have suffered a recession by now. Instead, it is the only major economy where output is above pre-pandemic trends. Its unemployment rate is hovering around 4%, well below the average of the past three decades. Even better, the bane of the past few years is fading away: inflation is set to return in 2025 to the Federal Reserve's target of a 2% annual pace.

One worry is that all this sounds too good to be true. Some economists fret that a slowdown in job creation augurs poorly for growth. Others have the opposite concern—namely, that inflation will prove stubborn. But in 2025 these fears are unlikely to materialise. With supply chains fully healed from the covid-19 pandemic and the labour market also back to

One worry is that all this sounds too good to be true

normal, price pressures will continue to recede.

With inflation abating, the Fed has already started reducing rates from their peak of 5.5% in September. It will take rates below 4% by the end of 2025, a level that will encourage businesses and consumers to spend more. And that, in turn, will allow the economy to make a soft landing in 2025. It would be an accomplishment to celebrate: a best-case scenario in which America wrestled down inflation without crushing growth. Mr Trump is sure to take credit for the strong economy, though Joe Biden will have played a bigger role in bringing it about.

So, how will Mr Trump's policies affect America's economy? His supporters believe that he will make it even stronger. Two parts of his programme could help. First, he has vowed to unleash a wave of deregulation. He will make it easier for energy companies to obtain drilling permits, for tech giants to deploy artificial intelligence and for financial firms to lend money. Second, he has vowed to slash taxes. But these policies may not deliver as much of a growth kick as Mr Trump hopes. Oil and gas production were already at record highs under Joe Biden, and there is not much scope for major increases. As for the tax cuts, with America's federal deficit already at 6%, at least some Republicans in Congress will object to Mr Trump's tax plans, limiting their eventual size.

Two other parts of Mr Trump's agenda present serious risks. He is hell-bent on raising tariffs, viewing them as necessary to bring more manufacturing back to America. And he wants to boot millions of illegal immigrants out of the country, a central promise of his election campaign. Together, these policies could prove a harmful combination: they would drive up the price of imports and strip the economy of workers, thereby weighing on growth and fuelling inflation.

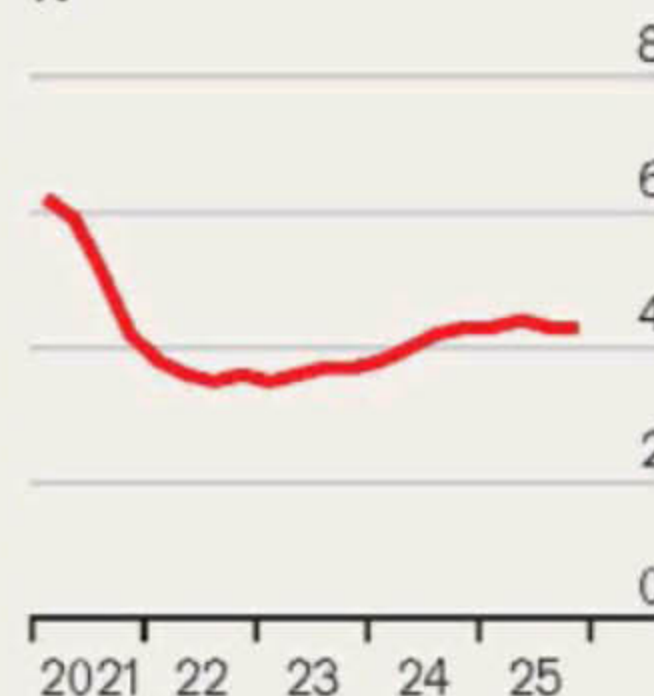
Much will depend on how aggressive Mr Trump is in his pursuit of his goals. He is likely to move swiftly in jacking up tariffs on China, but he may be a little more deliberate in slapping levies on the rest of the world. Stricter border controls will stanch the flow of people entering America from the south, but it will be harder to round up migrants already in the country.

The economic consequences of Mr Trump's worst policies may thus remain relatively muted in 2025. That is not to minimise the danger: as he escalates both tariffs and deportations, the fallout will increase. But in the coming year, at least, America's robust economy will overpower its corrosive politics. ●

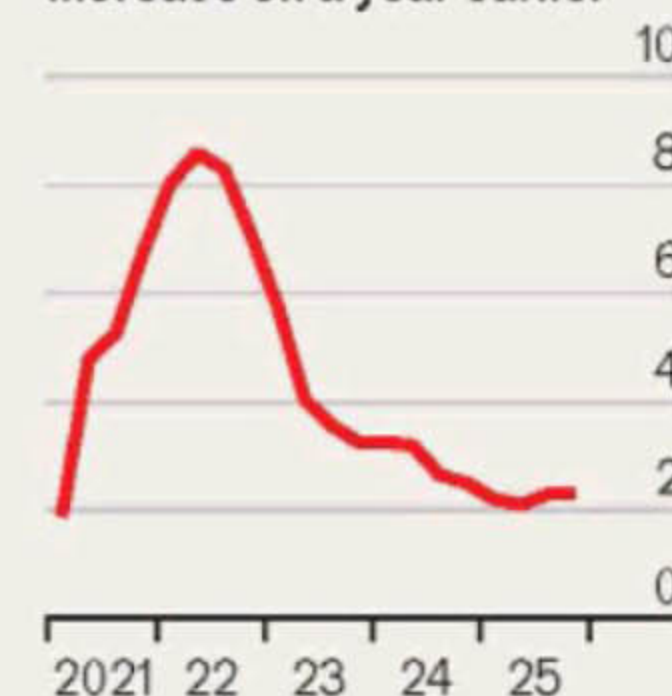
→ Outside the beltway

United States

Unemployment rate, %



Consumer prices, % increase on a year earlier



Sources: Bloomberg; Haver Analytics

A world in turmoil

In his contempt for allies, the new president will probably add to the chaos

Anton La Guardia Diplomatic editor, *The Economist*

TO UNDERSTAND THE forbidding world that Donald Trump will confront, open the 75-page report of a bipartisan commission on national security, published in July. "The threats the United States faces are the most serious and most challenging the nation has encountered since 1945 and include the potential for near-term major war."

America may have to fight several regional conflicts at once, which could merge into a global one. The country, the commissioners said, is not ready for such wars. Worse, Americans are scarcely aware of how the world around them is darkening.

The new president will inherit several crises. America is supporting two friends fighting protracted wars, Ukraine and Israel; and tensions are rising in Asia, with potential for conflict over Taiwan, the Koreas or the Philippines. The problems are all the harder to manage because four of the most prominent autocracies—China, Russia, Iran and North Korea—are increasingly making common cause. Nuclear threats are growing, too (see International section). Whether the quartet constitute a real alliance or not, their deepening partnership is fast becoming the frame of reference for Washington's foreign-policy debates. Every crisis is increasingly connected to broader geopolitical rivalries.

During the campaign Mr Trump veered between hyperbole about an impending "world war three" and glibness about how easily he could prevent it, without saying how. In office he may add to the turmoil.

But predicting what he will do is hard. Mr Trump presides over three broad schools of thought in the Republican Party. The "primacists" aim to preserve America's leadership and the global order it created. America must prevail just about everywhere, they argue; a victory for Russia in Ukraine would embolden China in its threats to invade Taiwan. In contrast, "prioritisers" argue that America is becoming dangerously overstretched. Better to concentrate its limited resources where they matter most, in Asia, and leave

Europe and the Middle East to fend mostly for themselves. The prioritisers, in turn, merge fuzzily with "restrainers", who generally want America to do less in the world. Mr Trump's picks for the big national-security jobs reflect the full range. Marco Rubio, his choice for secretary of state, is a conventional Republican hawk. Mike Waltz, named as national-security adviser, wants America to turn to Asia. Peter Hegseth, the choice for defence secretary, bemoans the "woke" military and leans towards isolationism.

At different times in his first term Mr Trump nodded towards all three groups. But he also has his own impulses: an obsession with trade deficits and tariffs; contempt for alliances; and an attraction to autocrats and a desire to make deals with them. So expect renewed trade wars, especially with China; threats to abandon allies or renegotiate terms with them; the partial or complete end of American military support for Ukraine; greater leeway for Israel in its wars and settlement policies; more economic pressure on Iran; and growing tension with Mexico on everything from trade to migrants and drugs.

A big question is whether and how far to increase defence spending, which is close to historical lows at about 3% of GDP and projected to decline. The bipartisan commission recommended a 3-5% real-terms increase in the next fiscal year, and thereafter a "glide path" to cold-war levels of spending (5-17% of GDP). That is a big jump at a time of strained public finances. The federal deficit is expected to reach 6% of GDP, and will grow substantially under Mr Trump's plans for tax cuts (though he hopes that tariffs on imports, and slashing wasteful spending, will fill the gap). Securocrats argue that deterrence is cheaper than war. But it is hard to imagine Mr Trump cutting benefits or raising taxes to pay for more weapons. ●



Green to brown

What Donald Trump's return means for energy policy

Vijay Vaitheeswaran Global energy and climate-innovation editor, *The Economist*

"BY FAR, THE single most important thing the US can do in this moment to combat the global climate crisis is to send Harris to the White House." So declared Manish Bapna, head of the NRDC Action Fund, an influential green lobbying group, in advance of the American presidential election. During his first term, Mr Trump embraced fossil fuels and tried to roll back environmental regulations. During the 2024 campaign, his energy mantra was "Drill, baby, drill!" and he mocked climate science and electric vehicles.

That stood in stark contrast to Kamala Harris, his defeated opponent, who threaded the needle by supporting both hydrocarbons and clean energy. She vowed to defend Joe Biden's climate accomplishments. The most important of these, the misnamed Inflation Reduction Act (IRA), would—if kept in place—spark a \$3trn investment boom into a range of low-carbon technologies over a decade. However, Mr Trump ridiculed that law on the campaign trail as the "Green New Scam" and vowed to kill it.

Now that Mr Trump has won, will Mr Bapna's fears be realised, or will the president-elect's pro-fossil-fuel and anti-climate rhetoric prove mere campaign bombast? Ideologues at the Heritage Foundation, a conservative think-tank, believe radical change is possible. With help from Trump advisers, they have prepared proposals to reverse environmental policies and speed up deregulation. Mr Trump has disavowed that effort, known as Project 2025, but parroted its main points on deregulation and embracing fossil fuels.

With Republicans in full control of Congress, some of that agenda will now move forward. There will be few new restraints on oil and gas drilling, and Mr Biden's pause on approvals of new projects to export liquefied natural gas will be lifted. Because nobody, including Mr Trump, expected him to win in 2016, he was ill-prepared to govern. Many of his appointees were incompetent loyalists, and their efforts at regulatory reform were

There will be few new restraints on oil and gas drilling

often sloppily executed. The NRDC brought 163 lawsuits against the Trump administration, and won 88% of those that were resolved. This time his advisers will be more competent and more formidable.

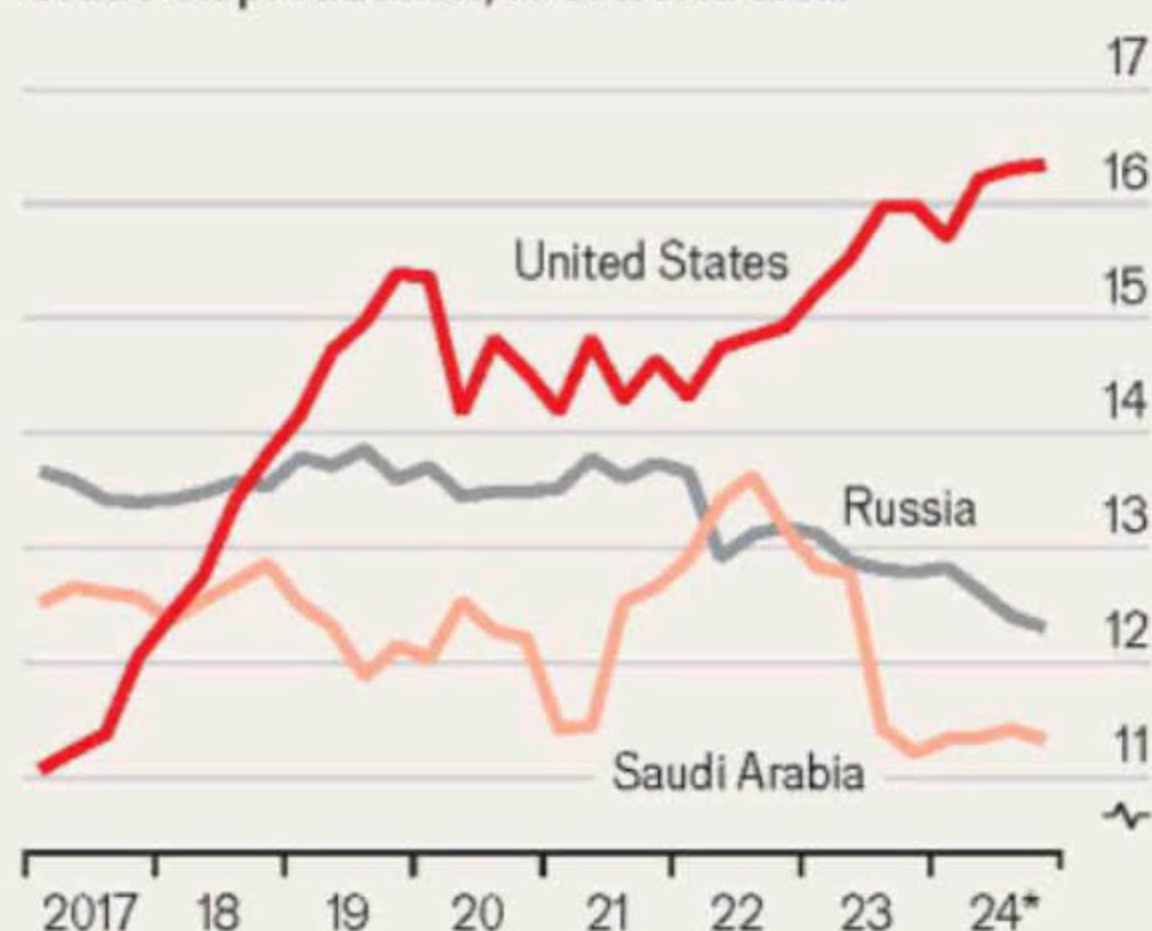
Still, American presidents have less control over energy than people think. Oil prices are largely set by the OPEC cartel. Mr Trump yanked America out of the UN's Paris agreement on climate change, but that neither led to a collapse of global efforts nor prevented an acceleration in climate action by states, cities and firms. To the chagrin of progressives, and due in part to conflicts in Ukraine and the Middle East, America became the world's biggest oil and gas producer during Mr Biden's term (see chart).

Mr Trump's promise to kill the IRA will probably fall flat as well. Nearly four-fifths of its lavish tax credits flow to Republican districts, which explains why nearly a score of Republican congressmen issued a letter opposing its repeal. Even a senior oil-and-gas lobbyist says his clients, who benefit from the IRA's subsidies for hydrogen production and carbon capture, "will go to the mat" to prevent its repeal.

Mr Trump's victory will not mean a collapse in climate efforts; clean-energy investment has gained a momentum of its own as the cost of renewables plunges. The fundamental question, says Mr Bapna, is whether America will be a leader or a laggard. But the policy uncertainty Mr Trump brings will give Wall Street pause. Wood Mackenzie, a consultancy, reckons that his presidency will reduce investment in America's energy transition by \$1trn, to roughly \$6trn, by 2050. America's economy will continue to get greener, but brown energy is not going away. ●

→ It's a gusher

Crude oil production, % of world total



Source: Rystad Energy

*Forecast for Q4



Over here

Donald Trump will try to upend America's immigration system

Aryn Braun West Coast correspondent, *The Economist*

NO ISSUE IS more tied to Donald Trump than immigration. While announcing his first run for president in 2015, Mr Trump called Mexicans criminals and rapists. Over the following nine years "Build the wall!" and "Mass deportation now!" became rallying cries for his campaigns. On the heels of his quick and decisive victory over Kamala Harris, Mr Trump will again try to curb legal immigration and deter the illegal kind. In 2025 his team will be more experienced and more effective.

America's immigration system is made up of scores of federal agencies. The process is badly outdated and confusing to navigate for immigrants and policymakers alike. Even with a trifecta—Republicans have captured control of the Senate and the House of Representatives, as well as the presidency—reform in Congress is doubtful. Even so, the president has broad authority to change immigration rules and set different priorities.

It is helpful to think about the changes Mr Trump could make on a sliding scale. On one side are technical tweaks. As in his first term, the president could limit the length of time for which a visa is valid, and make obtaining that visa harder by

increasing vetting, fees and waiting times. The number of people granted green cards would again plummet. The president also has the power to set the number of refugees accepted. For the next four years, expect that number to be very low.

At the border, Mr Trump has pledged to restart his policy which required some migrants who tried to cross the southern border to await court hearings in Mexico. But only about 70,000 migrants were enrolled in the programme, and that will only happen if Claudia Sheinbaum, Mexico's new president, co-operates. Mr Trump vows to drop a government scheme (which he calls an "app for smuggling illegals") that lets migrants make appointments to apply for asylum. He also intends to end programmes that Joe Biden used to try to control the migrant flow, offering some nationalities work permits but not a path to citizenship.

At the other end of the scale is Mr Trump's most extreme proposal: mass deportations. Little can be achieved on that front without extra funding from Congress. But even poorly executed attempts to round up migrants in America's interior would separate families and engender division between the Trump administration and Democratic-controlled states with laws protecting unauthorised immigrants who live there.

Some things will be beyond Mr Trump's control. His contentious policies will be challenged in the courts. If America's economy cools, fewer migrants will come looking for jobs. If Venezuela sinks further into ruin, more citizens may stream north.

There will be backlash. Increasing deportations or ending DACA, a law protecting from removal those brought to America as children, could rejuvenate pro-immigrant protests like those in Mr Trump's first term. That movement has gone quiet—but perhaps not for long. ●

A question of justice

Is “lawfare” now a permanent feature of American politics?

Adam O’Neal Washington correspondent, *The Economist*

COUNTLESS POLICY consequences follow from Donald Trump’s victory. But the result is also deeply personal for the new president. The election was, in part, a referendum on Mr Trump’s guilt in numerous court cases against him (in May he had been found guilty of 34 counts of falsifying business records). The Department of Justice (DoJ) began winding down federal cases against him the day after his election, and it became clear that he would not face sentencing for his existing convictions. But the first year

of Mr Trump’s second term will bring a reckoning for the rule of law in America.

Even before the president-elect’s legal travails captivated the nation, Americans lacked faith in their criminal-justice system. A 2024 Gallup survey found that only 21% had a “great deal” or “quite a lot” of confidence in the system, down from 34% in 2004. The intensity of this distrust will grow in 2025. The tragedy of the 2024 election is that either outcome would have led to profound cynicism on the other side.

Politicians have faced the possibility of being sent to prison throughout American history, typically over corruption, but presidents had largely avoided the vagaries of being investigated by law-enforcement officials while in office. Richard Nixon’s downfall brought about a new era of independent counsels that could threaten a presidency. Congressional Republicans made use of that process to investigate Bill Clinton, and Mr Trump’s situation supercharged the trend of criminal investigations infecting high politics.

The waters are muddy, because the cases involving Mr Trump are so varied. It seems clear that he mishandled classified documents, though the case was initially dismissed. And the business-fraud case in

which he was convicted relied on a novel legal theory that may not withstand scrutiny on appeal. The whole saga has created a dangerous situation that will play out throughout 2025.

How will an already dysfunctional Congress operate when matters of criminal justice are treated like partisan policy disputes? How many local prosecutors, Democratic or Republican, will try to raise their profiles on the back of shaky cases against national politicians? What does it mean if the Supreme Court and DoJ—which have been pulled into these controversies and must make decisions that disappoint half the country—no longer command respect from most Americans? And will candidates enter political races to reduce their chances of going to jail?

Those in power will see little reason to dial back tensions, on the assumption that the opposition will pursue them once it returns to office. Many are watching to see if Mr Trump has his political enemies investigated. If he called a legal truce, that could help prevent lawfare from spiralling out of control and becoming an everyday feature of American life. But, given the events of recent years, it seems unlikely. ●

Back to the states

What will happen with abortion rights now?

Sacha Nauta Social affairs editor, *The Economist*

ABORTION WAS one of the defining issues in the 2024 presidential election campaign. Kamala Harris used every opportunity to warn that a Trump victory would be disastrous for women and that her opponent would ban abortion nationally. Will this happen in 2025?

Although the return of Mr Trump is bad news for reproductive rights in America, he is unlikely to ban abortion outright nationally. First, passing such legislation would be very hard—the Republican party does not have the required supermajority in Congress. Second, Mr Trump has repeatedly said that even if such a bill made it to his desk, he would veto it.

Instead, battles over reproductive rights will continue to be fought primarily at the

state level. In eight out of ten states that held a referendum on abortion on November 5th, a majority of Americans voted to protect access (though in Florida’s case, not by enough to pass the state’s 60% threshold). In most cases this means protections for abortion access will be enshrined in state constitutions. But despite Mr Trump’s insistence that “it is up to the states” to decide on abortion policy, only half of American states allow such referendums. Governors in red states will

continue to block abortion access. Politically astute Republican politicians will reframe “bans” as “guardrails” or “safety limits”, recognising that harsh bans are unpopular: only 9% of Americans think abortion should be illegal in all cases.

The most substantive fights in 2025 will probably take place in courtrooms. Efforts in abortion-ban states will focus on trying to stop the flow of abortion pills into such states, and the flow of patients out. And having, in 2022, returned the issue to the states, the Supreme Court may have to look at the issue again in 2025. Questions around jurisdiction over interstate travel for terminations, the availability of abortion pills and obligations around emergency provision could all return.

At the federal level Mr Trump does have some levers to pull. In particular he has power over the main agencies involved in implementation of abortion-related policies. He could issue an executive order directing agencies to police access more strictly, for example by clamping down on interstate shipping, or the provision of abortion medication to minors, on the pretext of setting national safety standards.

Most likely, access to abortion will continue to diverge in 2025. It is only a matter of time before someone files a wrongful-death suit on behalf of a girl or woman who lost her life because doctors were too frightened to provide the medical care she needed. ●



↑ On the streets, in the courts

By Invitation

How America should deal with the quartet of chaos

THE SECOND COLD WAR began with Xi Jinping's accession to power, Vladimir Putin's disposal of term limits in 2012 and Russia's ingestion of 7% of Ukraine in 2014. Both leaders have signalled that international norms no longer matter and they have deepened their relations with Iran and North Korea, portending a hostile alliance variously known as CRINK, the axis of upheaval or the quartet of chaos. In 2025, how should America respond to it?

Each of the four seeks international successes to vindicate different power paradigms. Mr Putin wants to conquer Ukraine to prove Russia's greatness. Mr Xi aims to maintain the Communist Party's power monopoly by rallying nationalism to take Taiwan. In North Korea, Kim Jong Un is building a nuclear arsenal to retain his throne. Ali Khamenei wants to vindicate his brand of Islam by extending Iran's regional domination.

Each also prioritises different theatres: eastern Europe and the Caucasus for Russia; north-east Asia for North Korea; the Levant for Iran; and the near seas for China. And each faces different primary adversaries: Ukraine for Russia; South Korea for North Korea; Israel for Iran; and, depending on the trouble China chooses to make, Taiwan, India or another country. Because the rules-based international order precludes their military choices, they share the ultimate goal of overturning those rules and the institutions enforcing them—making America a common secondary adversary.

Given that the quartet's primary adversaries, intermediate objectives and main theatres do not align, each will veto other members' plans that conflict with their own. North Korea relies on Sino-Russian

History offers valuable lessons, argues Sarah Paine, professor of history and grand strategy at the US Naval War College



tension to avoid domination by either. Iran fears dependence on Russia. Neither China nor Russia wants one power, let alone Iran, to dominate the Middle East. Neither wants the other to dominate Central Asia, but each seeks to do so itself. Siberia has resources China covets on lands the tsars stole, so expect marriage problems.

The quartet faces growing opposition. Their shared antipathy towards the rules-based global order threatens the prosperity of every beneficiary of the legal security those rules provide. Most

America won the first cold war through a strategy of assisted suicide

countries are small, so their security depends on the rules.

How will this cold war play out? History offers guidance. First, it will not end soon. Only after several generations did Chinese and Russian leaders conclude that emerging from poverty required co-operation with the West. So they called off the first cold war. But those leaders have since died.

America and its allies won the first cold war through a strategy of assisted suicide. They opposed communism for its brutality, economic ineptitude and continentalist penchant for military over-extension. Given Russian and Chinese recidivism, America and its allies should again amplify those economic and military weaknesses to fast-track their impoverishment

and reduce their ability to fund military adventures.

To do so, they should use sanctions—not to change behaviour but, like chemotherapy, to shrink the tumour. Comparing North and South Korea illustrates the long-term compounding effects of reducing economic growth by a percentage point or two. Ratchet up enforcement by eliminating the dark-money havens sheltering the kleptocrats—and use that money to aid their victims.

Another lesson is to emulate the greatest generation. The conscripts of the first world war rose to leadership roles amid the Depression, and then had to send their own children to fight another world war. Their solution was institution-building on a global scale, including the UN, the IMF, NATO and the predecessors of the WTO and EU. They created forums to resolve differences, not with soldiers, but with lawyers and diplomats, maintaining peace in the industrialised world until Mr Putin invaded Ukraine. So deepen co-operation in the West, build an equivalent institutional architecture in the East (Japan's prime minister, Ishiba Shigeru, has called for an "Asian NATO") and extend it globally.

Finally, do not despair over Russia's and China's U-turn on the road to prosperity. During the first cold war, the winners prospered while their enemies endured poverty of their own making. The rules-based order, however flawed, is positive-sum through compounded growth and the facilitation of co-operation. Countries vested in the rules-based order should foster each other's economic growth during the long wait for others to relearn that territorial expansion is a negative-sum proposition that obliterates wealth and lives. ●

MENTORING NEXT-GEN WOMEN IN TECH

How one Brazilian student is leading by example



17-year-old Giovana Rocha dos Santos from Campinas in Brazil says Samsung Innovation Campus, a programme which has been training young people in the country since 2020, ignited her passion for technology and opened her eyes to career opportunities in the sector. She wants to help guide future cohorts to follow in her footsteps and leverage all that the programme has to offer.

In 2022, while studying Technical Electronics at the Federal Institute of São Paulo (IFSP), I first learned about Samsung Innovation Campus—a programme that would go on to change my life.

When I realised I would be able to learn Python and artificial intelligence (AI) skills through the programme, classes that I

the use of advanced libraries. The course platform had a clear sequence of content to follow, while teachers taught us the project methodology in parallel. The study materials were also translated into Portuguese and presented in an organised way, which made it easier for me to enter the world of IT and programming, topics I was worried I would struggle with.

The classes emphasised identifying problems and seeing how they could be solved with Python. So, I began to brainstorm ideas with the teachers who encouraged us to look at our daily lives. That sparked my project, DriveSafeAI.

Every day, I walk along Avenida John Boyd Dunlop, which is considered the largest road in Campinas city. The road

“Now equipped with the technical knowledge and soft skills I gained during the course, it has given me the confidence to pursue a career in technology.”

Giovana Rocha dos Santos, participant of Samsung Innovation Campus 2023

did not have access to in my curriculum, I realised I could not pass up this opportunity to deepen my knowledge of tech.

DRIVEN BY DATA

Samsung Innovation Campus was my gateway to the world of technology and innovation; it took me on a journey of discovery. It fuelled my passion for using technology in practical ways to solve real-world problems—which inspires me much more than solving an exercise in a book.

I learned Python first and then AI. The classes were dynamic and covered the basics like initial concepts to

is jammed with cars, trucks, motorcycles and bicycles and along the sidewalks are billboards with traffic-accident statistics. My goal was to develop a data-analysis algorithm using Python that indicates the risk of accidents occurring in particular spots along the road at different times of day. I felt that with this information, local authorities could use preventative measures, such as signs and traffic police, in a more targeted and effective way.

The support I received from my teachers and mentors at Samsung Innovation Campus was invaluable to my project. They guided me in identifying which traffic-data elements



were helpful for the analysis I wanted to do. Knowing I could get their help whenever a doubt arose in my mind boosted my confidence in solving the challenge.

FROM STUDENT TO MENTOR

After completing the programme, I secured an internship at the State University of Campinas, also known as UNICAMP. My work currently involves developing prototypes for renewable-energy solutions. At the same time, I am continuing to develop DriveSafeAI. I recently requested new data from municipal authorities and am building additional variables into the algorithm to make it more accurate.

I am hoping my next step will be to study engineering at university level. In the long term, my dream is work abroad for a company that believes in empowering young people and women around the world.

In the short term, I have been appointed as a mentor for this year's Samsung Innovation Campus, which means I will be helping five students brainstorm and develop their projects. I am really excited by this role; I see this as an opportunity for personal and academic growth.

A LIFECHANGING EXPERIENCE

My experience at Samsung Innovation Campus 2023 was incredible. It was a fruitful, creative and productive period of my life.

While I developed core technical skills, such as Python, I also learned how to pitch and honed interpersonal skills. The

latter is especially important as I am now able to talk about tech and science with researchers without getting nervous.

The programme also included an employment module. Aimed at helping prepare students for their working lives, I had the opportunity to receive career guidance, and to learn about resume preparation and how to network.

The teachers were always available to support us and answer our questions. Additionally, we had access to IFSP's laboratory, where we could use manufacturing equipment and materials.

More importantly, the programme was free of charge, which gave me access to resources and materials that I would not have been able to afford otherwise.

If I had to sum up my time at Samsung Innovation Campus, it was a journey of technological discovery, where I found myself as a woman in tech and science at the end. Now equipped with the technical knowledge and soft skills I gained during the course, it has given me the confidence to pursue a career in technology—and a clearer vision for my future.



In more than 30 countries, Samsung Innovation Campus is preparing young people for tomorrow's workplace by equipping them with skills in new and emerging technologies.

To learn more, visit bit.ly/future-is-you or scan the QR code.

The Americas



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Handle with care

MEXICO CITY

What Donald Trump's return means for Latin America

Sarah Birke Bureau chief for Mexico, Central America and the Caribbean, *The Economist*

DONALD TRUMP'S decisive victory in the United States was met with trepidation across most of Latin America. And with good reason: the impact of his return to the White House in 2025 will be felt across the region. Mr Trump may not have mentioned Latin America much during the campaign, with the exception of Mexico, which he regularly bashed. But the main topics he cares about—illegal immigration, trade imbalances and drugs—put the Americas in the crosshairs. And Marco Rubio, Mr Trump's pick for secretary of state, cares more about the region than

many: he is the son of Cuban immigrants.

The first challenge will be Mr Trump's plans for dealing with migrants. The vast majority of the millions of people Mr Trump says he wants to deport are Latin Americans: of the estimated 11m people residing in the United States illegally, over 4m are Mexican, 2m are from Central America, over 800,000 from South America and 400,000 from the Caribbean. Latin American countries would struggle to absorb them. And their economies would take a big hit from the loss of remittances, which make up 20-25% of GDP in El Salvador, Guatemala and Honduras.

Latin Americans also accounted for the vast majority of the 2.1m encounters at the southern border in 2023. To reduce that number, Mr Trump is likely to bring back some of his policies, such as trying to strong-arm other countries into accepting asylum seekers, cracking down on migrants to deter them or, in the case of Mexico, making them wait on their side of the border. Given that the root causes of migration remain (see next article), this could cause chaos.

Mexico, now the largest trading partner of the United States, will be the country most affected by Mr Trump in other ways, too. He has threatened to impose tariffs on day one, in part to reduce his country's trade imbalance with Mexico, which was \$159bn in 2023. Mr Trump is also unhappy about car factories in Mexico, and Chinese investments. Mexico says it would hit back with its own tariffs, which would cause a costly trade war. All this could blow up the United States-Mexico-Canada Free Trade Agreement (USMCA)

▶ which Mr Trump himself negotiated during his first presidency. Cool heads may prevail: North America's economies are deeply integrated and any disruption would hurt them all. Mr Trump may consider a review of USMCA, due in 2026, as a chance to make deals.

His return may also put the kibosh on nearshoring, which many of the region's countries are betting on to juice their sluggish economies. Mexico had hoped to be the main benefactor of efforts by companies in the United States to decouple from China, a policy Mr Trump pushed in his first term that was bolstered by supply-chain disruptions caused by the pandemic and Russia's invasion of Ukraine. But Mr Trump wants firms to reshore to the United States, rather than to nearshore. This would reverberate beyond Mexico, to Chile and Costa Rica, among other countries.

Mexico could also be hit hard by Mr Trump's attempts to stem the influx of fentanyl, a drug made by gangs in Mexico and exported north, and which killed around 75,000 Americans in 2023. Mr Trump may be restrained from bombing gangs' drug laboratories, as he has threatened to do. But he is likely to take a more invasive and unilateral approach to the security threats coming from Mexico than previous administrations.

Mr Trump wants firms to reshore to the United States, rather than nearshore

Under Joe Biden, the United States put supporting democracy on the back burner, but it did help Guatemala's president overcome resistance by anti-democratic forces to take power after his electoral win. Mr Trump is unlikely to care about such things. He likes strongmen, chief among them Nayib Bukele, El Salvador's president. He is currently serving an unconstitutional second term and has shown little regard for human rights in his crackdown on crime. Another is President Javier Milei of Argentina, who hopes Mr Trump's return may help him get a \$15bn IMF loan to help his radical overhaul of Argentina's economy.

Mr Trump and Mr Rubio will look rather less kindly on Latin America's leftist autocrats in Cuba, Venezuela and Nicaragua. During his first term Mr Trump turned the screws on Venezuela and ended Barack Obama's policy of normalising relations with Cuba. Less certain is what faces Brazil's current president, Luiz Inácio Lula da Silva. He is no Trump bedfellow, but could benefit if Mr Trump's "America First" strategy frees him to pursue his ambitious goal of trying to lead the global south. What is clear is that if Latin America was tested by Mr Trump the first time he occupied the White House, things will be even tougher in 2025. ●

Crossing continents

The struggle over migration in Latin America will intensify in 2025

Kinley Salmon Latin America correspondent, *The Economist*

AS 2025 BEGINS, migration in Latin America remains as politically fraught and physically dangerous as ever. The pressure to migrate was highlighted in July when Nicolás Maduro, Venezuela's president, stole the election and cracked down on protesters. Now Donald Trump's victory brings the prospect of mass deportations and crackdowns at the Rio Grande. Few countries in Latin America are as crude, but barriers are going up within the region, too.

Such barriers may put off some migrants, but plenty of push factors are still causing people to pack their bags. Those factors may even increase in some hotspots. The biggest rise in migrants in 2025 will probably be those fleeing Venezuela. Some 7m people have left in the past decade. After Mr Maduro is inaugurated in January more will go, especially if Mr Trump further sharpens economic sanctions. Most Venezuelans who have left since 2015 have remained in



Latin America. Colombia alone hosts 2.5m. Others will try to reach the United States.

Migrants have plenty of reasons to leave other countries, too. Haiti is still overrun by gangs, despite the arrival of a Kenyan-dominated international police force. Cuba's economy is struggling, even by its own standards. Cubans and Haitians are historically most likely to aim for the United States, though in the past decade many Haitians have headed to Chile, while some Cubans travel south to Brazil or Uruguay. More Ecuadoreans, reeling from rampant gang violence, are leaving, too. In

El Salvador, President Nayib Bukele's security crackdown has eased one reason to migrate, but the economy's sluggish performance, expected to continue in 2025, is strengthening another.

It is not just Latin Americans migrating on the continent. Chinese, Indians and Africans are also trying to reach the United States by flying into the region and hiking north. More than 37,000 Chinese were found by border patrols at the southern border of the United States during 2024. Some are also staying in Latin America. Mexico granted 5,000 temporary residency visas to Chinese immigrants in 2023.

Latin American governments will step up their own crackdowns on migrants in 2025. In Panama, the new government is less friendly to those coming through the Darién Gap from Colombia, and has increased deportation flights. Chile, a big destination for Venezuelans, will hold elections in 2025. It will probably move to the right and further limit immigration. It is also getting harder for Venezuelans to enter Peru, which already hosts 1.5m of them. Even in generous Colombia, which has given millions the right to work, a new wave of Venezuelans could prompt a backlash. In Canada the Conservatives, who have promised to quickly reduce immigration, are on track to win the election in the coming year.

Migration routes are changing, too. More migrants, especially from outside the region, may fly into Nicaragua to avoid the Darién Gap before heading north. Panama's crackdown will push others onto dangerous sea routes and into the hands of unscrupulous traffickers. Tragedies, alas, will soon follow. ●



Crime and hard punishment

Two elections could show growing support for tougher security policies

Ana Lankes Brazil correspondent, *The Economist*

ENTHUSIASM FOR a ruthless approach to crime is spreading. That is in part thanks to Nayib Bukele, the president of El Salvador, who in 2022 declared a state of emergency and has thrown 80,000 people, or 2% of the country, in jail. Human-rights groups say torture and death in prison are common. Salvadoreans seem not to mind: homicides have plummeted and Mr Bukele was re-elected by a landslide in 2024.

Other leaders have cheered Mr Bukele's "iron fist" model and, to varying degrees, are trying to emulate it. In June Argentina's defence secretary signed an agreement to strengthen security ties with El Salvador. Ecuador has renewed various states of emergency since the start of 2024.

In 2025 concerns about crime will shape presidential elections in Ecuador, which has rapidly become home to some of the world's most violent cities, and in Chile, where the murder rate has risen from 4.5 per 100,000 people in 2019 to 6.3 in 2023, slightly above that of the United States. Pressure to crack down is mounting.

Ecuadoreans vote in February, less than two years after a snap election brought Daniel Noboa to the presidency. They will elect a president for a full four-year term, and choose all 151 members of Congress. Shortly after Mr Noboa assumed office, gangs unleashed havoc, blowing up cars and taking over prisons. He sent the army and police onto the streets and into prisons. Thousands of people have been arrested. The government claims the murder rate and robberies have fallen, though not by much. Mr Noboa, who is running for re-election in February, will probably pledge to clamp down harder.

In Chile a young leftist, Gabriel Boric, was elected president in 2021 after national protests demanded greater equality. But Chileans became concerned that crime was on the rise because of immigration, which has surged. To assuage allegations that he is soft on crime, Mr Boric tried to expand police officers' self-defence powers, increased the security budget and announced the construction of a new maximum-security jail.

Sniffing the electoral mood, the opposition has decried these moves as half-hearted. Right-wing legislators and mayors have called for a state of emergency to be declared in the capital, Santiago, and for the temporary suspension of visa requests for migrants from 13 countries including Venezuela and Ecuador. A turn away from youthful idealism towards tough-on-crime candidates seems likely in the general election in November 2025, when Chileans again elect a president and renew Congress's 155 seats. If Ecuador and Chile move towards the "iron fist" model, other leaders will surely take notice. ●

Banking the unbanked

Progress is being made in Latin America, but it is a long road

Sarah Birke Bureau chief for Mexico, Central America and the Caribbean, *The Economist*

THE WORLD'S 1.4bn people without a bank account are missing out. They lack the security it provides compared with informal ways to save and the benefits of participation in the formal economy, all of which imposes a drag on economic well-being and growth. But there is good news in Latin America and the Caribbean. The number of people in the region opening their first account has been growing faster than the global rate.

In 2021, 6% more Latin Americans had a bank account than in 2014—double the global increase of 3% over that period. In 2025 financial institutions will aim to maintain that momentum by focusing on women, rural populations and poorer people, who remain unbanked at disproportionately high rates.

The region's progress underscores how much further it has to go, however. About 26% of Latin America's population still do not have an account, a lower percentage than in sub-Saharan Africa or South-East Asia, but higher than in East Asia and the Pacific. Disparities within Latin America are stark: just under half of Mexicans over the age of 15 have an account, compared with 73% across the region.

Many people distrust banks and lack financial literacy. Large informal sectors incentivise people to shy away from formal banking. ►►

→ Withdrawal symptoms

Adults with a bank account, % of total



Source: World Bank

*2011 †2022

► services. It does not help that banks across the region often charge high fees.

The covid-19 pandemic was a catalyst for progress in financial inclusion. With much of the population stuck at home, digital transactions that required more than just cash gained traction. Government policies have also played a role. In Colombia and the Dominican Republic, pandemic-related transfers were made only to bank accounts, in order to encourage financial engagement. Governments in Brazil and Mexico introduced their own digital-payment systems, with mixed success.

A growing private fintech market is playing its part. Challenger banks are offering new, user-friendly options. They are being aided by the roll-out of “open banking” in the region, which enables and encourages financial institutions to share data, within strict privacy and security limits. Brazil is a world leader. Nubank, founded in Brazil in 2013, entered Mexico

About 26% of Latin America's population still lack a bank account

in 2020 and now has 7.8m users there. Such competition is driving down costs and pushing traditional banks to innovate.

However, not all attempts to reduce cash usage have been successful. In 2021 the president of El Salvador, Nayib Bukele, made bitcoin legal tender, claiming that use of the controversial cryptocurrency would boost financial literacy. Many Salvadoreans duly downloaded a virtual wallet to gain a \$30 bonus, but then abandoned it, concluding that bitcoin is too volatile to be used as a currency.

Challenges to full financial inclusion in Latin America remain. Many people open accounts but then leave them dormant. Having a bank account does not

necessarily translate into access to credit. Between 2014 and 2021, the uptake of credit cards and loans in Latin America grew more slowly than the global average, even though the number of new bank accounts grew more quickly.

The region's biggest challenge is ensuring that financial inclusion does not exacerbate inequalities. The gender gap in access to financial services has narrowed globally, but it has widened in Latin America. Similarly, rural populations and poor people are less likely to have access to financial services than their wealthier, urban counterparts.

Financial inclusion is not just about where people store their money: it drives savings, investment and entrepreneurship. Conversely, lack of inclusion hampers growth and exacerbates poverty. As the whole region continues to grapple with slow growth and high poverty rates, expanding financial inclusion in 2025 will continue to offer significant benefits. ●

Time's up

Justin Trudeau is unlikely to win Canada's election

Robert Russo Canada correspondent, *The Economist*

JUSTIN TRUDEAU has begun what is almost certainly his final election campaign. The Canadian prime minister is defiantly seeking a fourth consecutive mandate despite a year of relentlessly sliding support. Such is the antipathy towards Mr Trudeau and his Liberal Party that three-quarters of Canadian voters disapprove of them, according to polls during 2024. An easing of interest rates, a steady drop in inflation to just over 2% and a breather in the dizzying ascent of house prices have done little to arrest the decline in Mr Trudeau's support.

In September 2024 special elections in two constituencies, which had been reliable Liberal seats for years, provided direct tests of his appeal. The Liberals lost both, pro-

voking pointed questions about Mr Trudeau's leadership from once-stalwart supporters. Many of them cast envious glances across the southern border after the swift and bloodless switch made by Democrats in the United States at the top of their ticket. Some Liberals, including Mark Carney, a former governor of the Bank of England, have started to assemble embryonic leadership campaigns in preparation for the possibility that Mr Trudeau, who singlehandedly revived their moribund party nine years ago, will choose to step aside.

But Mr Trudeau insists that he is not going anywhere. Aged 52, he is now the longest-serving leader in the G7 and is determined to host the group's next summit in the Canadian Rockies in June. That show-case, along with an expected series of further interest-rate cuts that may kickstart an anaemic economy, is what keeps him turning up for work, his supporters say. So does the prospect of confronting the Conservatives' pugnacious leader, Pierre Poilievre.

Mr Poilievre was first elected as a 25-year-old MP two decades ago. His assiduous

wooing of the younger and working-class voters who propelled Mr Trudeau to power in 2015 seems to be working. Conservatives rarely do well with those voters, but Mr Poilievre's early focus on inflation and the runaway cost of housing won him unexpected support. Polls suggest that his Conservatives will win a sweeping majority in the forthcoming elections, which must take place before the end of October 2025.

Whoever wins, there will be little time for celebration. Canada is heavily dependent on trade with the United States: trade in goods and services between the two countries was valued at \$909bn in 2022. But that formidable economic activity is underpinned by a North American free-trade agreement which comes up for review in 2026, with negotiations beginning in 2025. Donald Trump's personal disdain for Mr Trudeau, along with his promise to level a 10-20% tariff on all imports, will make those discussions nerve-racking for Canadian companies and their employees, given their dependence on access to the booming American market.



By Invitation

Argentina: the making of an economic miracle?

BY THE CLOSE of 2023 Argentina was teetering on the edge of a precipice, beset by a confluence of economic ills reminiscent of its most harrowing crises. The monetary overhang had ballooned to twice the level of 1975, which triggered the infamous *Rodrigazo*, an inflationary spiral that ushered in five decades of stagnation. The central bank's interest-bearing liabilities had swelled to four times the monetary base, surpassing even the ratio of 1989 that precipitated hyperinflation. By the year's end GDP was in free fall after 15 years of stagnation. Prices increased during 2023 by 211%.

Faced with impending disaster, swift and decisive action was our only recourse. We began by slashing public spending by 30% in real terms, achieving fiscal balance in our first month in office. We also devalued the currency and raised import taxes, narrowing the black-market premium from over 100% to a more manageable 25%. Country risk, a measure of the risk of default, plunged by 40% and monthly wholesale-price inflation (which spiked to 54% in December 2023) fell to 2%.

In a bold departure from Argentina's long history of fiscal excesses, our primary policy is the pursuit of a balanced budget. Our financing needs, aside from rollover, will be nil. With total nominal debt stock remaining flat, our debt-to-GDP ratio will steadily decline, effectively restoring fiscal solvency. In a country where promises are often made lightly, we focused on making our commitment to fiscal balance into a tangible reality. As we prove in the coming months that we can sustain our commitment to fiscal solvency and repay our outstanding foreign debts, the country's risk premiums should

Governing with economic prudence has revived growth, says Javier Milei, president of Argentina



gradually disappear, paving the way for increased savings, higher productivity and real-wage growth.

Our monetary policy has undergone several distinct phases. The initial phase involved eradicating money-printing to fund government spending. The second phase saw the elimination of the central bank's remunerated liabilities, phasing out the interest-rate-driven automatic growth of money supply. With those liabilities gone by our seventh month in office, further money growth was

If we succeed, many might label our achievements a "miracle"

solely the result of the central bank buying dollars, potentially risking a higher-than-acceptable monetary expansion. To avoid this, we have transitioned to our third (and current) phase, where we have diminished these purchases of reserves, thus stopping this remaining source of further money-printing.

Now it is only a question of time until inflation drops to international levels (if not lower). Once that is achieved we will lift capital controls and cease all remaining foreign-exchange interventions.

Economic growth is on track to recover, driven by both cyclical and structural factors. After a sharp fall, wages and pensions in the private sector are now rising, fuelling aggregate demand and higher

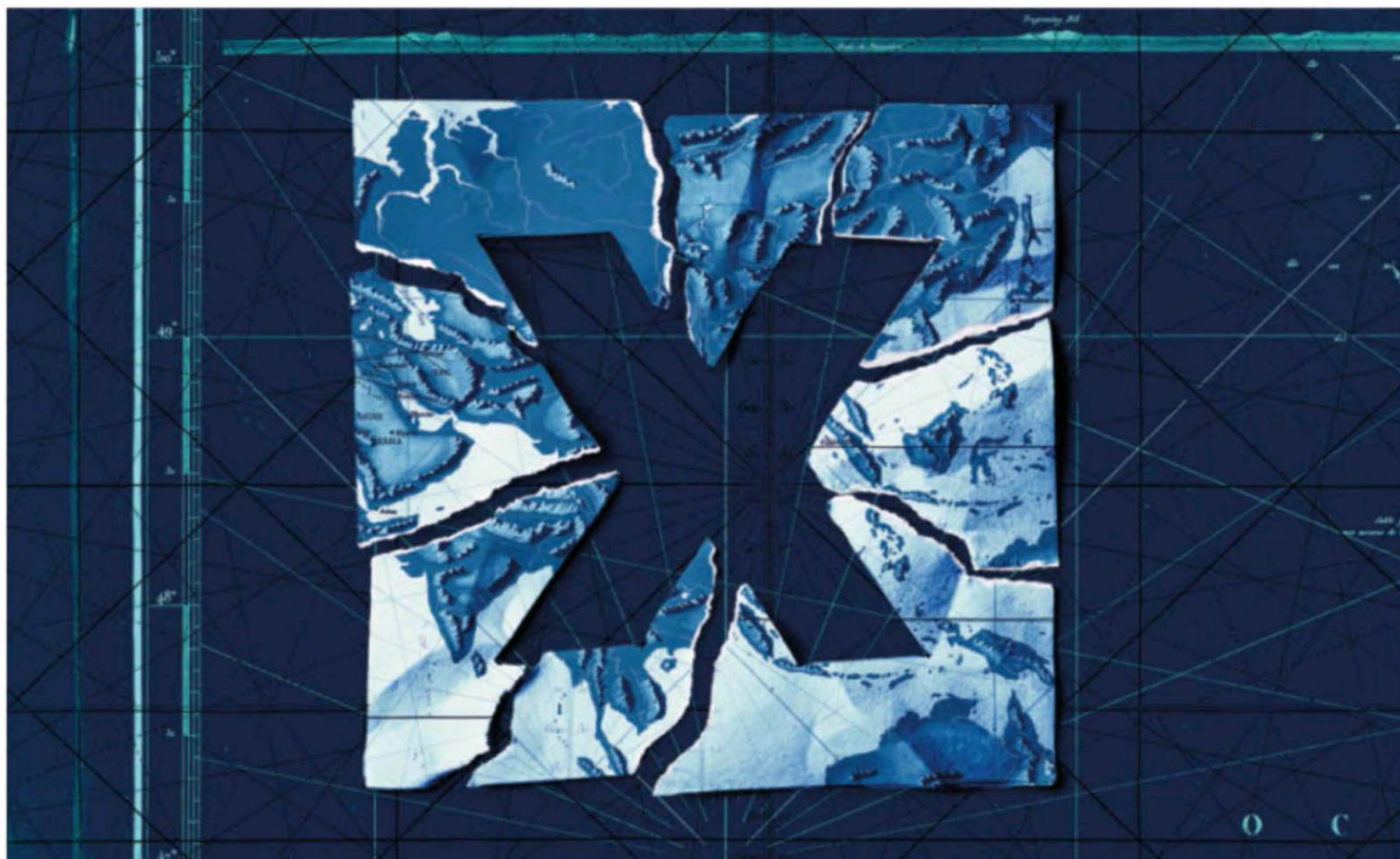
capacity utilisation. Inventories stockpiled in 2023 in anticipation of hyperinflation have been gradually winding down, further normalising aggregate demand. On the structural side, we will reap the benefits of a 15%-of-GDP boost in aggregate savings, courtesy of fiscal adjustment.

This is being combined with an ambitious programme of structural reforms—largely encapsulated in the Bases Law passed by Congress in July. Scrapping rent-control laws, for example, has led to a 170% increase in supply and a 40% drop in real rental costs. Additionally, the reduction in country risk premiums, stemming from the restoration of fiscal sustainability, serves as a powerful catalyst for savings and investment.

What lies ahead in 2025 is more of what we've already done: strict fiscal balance, no money growth and deregulation. Argentina has suffered from an overdose of deficits, money-printing and useless regulations. All that needs to go. As we pursue a smaller government, fiscal consolidation will need to deepen. And, mindful of the fiscal balance as we always are, we know that it is lower expenditures that open the way for lower taxation. We are also aware that undoing Argentina's regulatory mess will take time. There the challenge is to keep the reforms on the move.

We have made significant strides, yet much remains to be done. If we succeed, many might label our achievements a "miracle". But it is no miracle—it is the result of governing with macro-economic prudence and adhering to the principles of economic freedom that have enriched nations. We work to show the world that embracing the ideas of freedom brings prosperity. ●

Asia



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By the people, for the people

Democracy is under pressure across the region

Emma Hogan Asia editor, *The Economist*

FANS OF DEMOCRACY breathed a sigh of relief in June 2024, when India's electorate returned Narendra Modi, the prime minister, to government with a weakened mandate. Mr Modi had been gunning for a landslide win for his third term, boasting beforehand of how his party would win 400 of the 543 seats, giving him free rein to ram through legislation. But his Bharatiya Janata Party (BJP) managed to garner only 240 seats, which has forced Mr Modi to govern in a coalition, tempering his Hindu-nationalist agenda and some of his strongman instincts.

Then in August, widespread protests led to the

ousting of Sheikh Hasina, Bangladesh's prime minister, who had become increasingly autocratic. Both events seemed good omens for the struggle between democracy and autocracy in Asia. Is such optimism likely to spread in 2025?

Take India first. Asia's biggest democracy appears to be flourishing—up to a point. On the face of it, Mr Modi is acting as if little has changed since his humbling at the polls: his rhetoric still combines Hindu nationalism with an emphasis on development. His cabinet has not changed much since the election. But the opposition has been emboldened and civil society has become more confident, meaning that Mr Modi has had to make a series of U-turns on issues such as Muslim charities and a controversial broadcasting bill.

The Supreme Court has also blocked BJP-run states from introducing measures that could have been used to target Muslims. More about-turns are likely in 2025, not least as Mr Modi faces increasing criticism from the Rashtriya Swayamsevak Sangh (RSS), a Hindu-nationalist organisation linked to the BJP. A round of state elections recently went better than anticipated (the party unexpectedly won in the state of Haryana), but suggested that Mr Modi is less of a vote-winner. In Haryana, for example, local issues predominated.

In the rest of South Asia, the messy business of building democratic institutions will continue. In Bangladesh, the process of establishing a stable society after the exit of Sheikh Hasina will carry on under Muhammad Yunus, an economist and microcredit pioneer, who was appointed leader of the interim

▶ government. Tensions will remain with India, where Sheikh Hasina fled; in October Bangladesh issued a warrant for her arrest. Their strained relations have been stoked by reports that members of the Hindu minority have been attacked in Bangladesh, and by its government's decision to remove the physical inspection of any imports from Pakistan, raising fears that illegal arms could be shipped into the country.

In Sri Lanka, where the new president, Anura Kumara Dissanayake, hails from a party that started as a revolutionary Marxist-Leninist movement, the next few years are likely to be rocky. Mr Dissanayake (known as AKD) is no Marxist zealot, has toned down the rhetoric of his party and has pushed the need for market reforms. But he is untested in power, having served only as agriculture minister 20 years ago. He will probably lead an unstable coalition that needs to undertake painful economic reforms.

Thus it is in South-East Asia where the most worrying examples of anti-democratic politics seem likely to emerge—in particular in Indonesia, where Prabowo Subianto was sworn in as president on October 20th. Mr Prabowo, the defence minister under Joko Widodo (known as Jokowi), his predecessor, was a general, and has been accused of atrocities in the former territory of East Timor (he denies the allegations).

Mr Prabowo started off his presidency with an eccentric initiation ritual: members of his bloated cabinet (with over 100 people, it is the largest since democracy returned in 1998) were summoned to a boot camp at Mr Prabowo's alma mater, the military academy, five days after he was sworn in as president. More

Jokowi's son is Mr Prabowo's vice-president

worryingly Tom Lembong, a high-profile opposition politician, was arrested soon after that. Prosecutors insist that the charges against him are not politically motivated, but it still looked like a signal to the president's opponents. But it is not just the fact that Mr Prabowo may have more authoritarian instincts that makes his recent elevation to the presidency worrying. It is also because he is likely to be overshadowed by Jokowi, who came to power in 2014 promising to oppose the dynastic politics of old. Yet Jokowi's son is now Mr Prabowo's vice-president, and institutions have been weakened under Jokowi's rule.

The situation looks grim, too, in Thailand. In August, Pita Limjaroenrat and his Move Forward Party, which won a plurality of seats in the election of 2023, were banned by the constitutional court. Mr Pita and other party leaders were barred from participating in politics for a decade. The court argued that Move Forward's plans to reform the country's harsh *lèse-majesté* law were a threat to Thailand's monarchy. Many of the protesters who took to the streets in 2020, when Move Forward's predecessor party was dissolved, are still in jail. Even if further protests take place, the lack of democratic accountability is clear.

And in Myanmar, where a military junta took over in a coup in 2021, hopes for a democratic breakthrough by rebel forces fighting the army look dimmer than ever. The junta will probably not fall. But the armed rebel groups that are gaining ground are unlikely to support democratic rule, and they continue to be supported by China. It is a damning indictment of democracy's plight in Asia in 2025. ●

Investing in India's future

Will private firms step up to maintain the country's investment splurge?

Simon Cox China economics editor, *The Economist*

NARENDRA MODI, India's 15th prime minister, is no great fan of the first person to do the job. Jawaharlal Nehru, who led India from independence in 1947 until his death in 1964, was an urbane socialist who once wrote that the spectacle of organised religion filled him with horror. To him, "the temples of modern India" were dams and other marvels of infrastructure. All of this is antithetical to Mr Modi, a tub-thumping Hindu nationalist of modest upbringing. But in their approach to the Indian economy, the two prime ministers share a striking similarity: a heavy reliance on public investment.

Mr Modi's coalition government plans

to devote over 11trn rupees (\$130bn) to capital expenditure in the year to the end of March 2025, an increase of 230% in five years (ignoring inflation). The benefits are visible in new airports, railways and roads. Today Nehru would find many temples of progress at which to worship.

This state-led boom is a bit of a surprise. Mr Modi came to power in 2014 promising to unleash private enterprise by offering "minimum government,

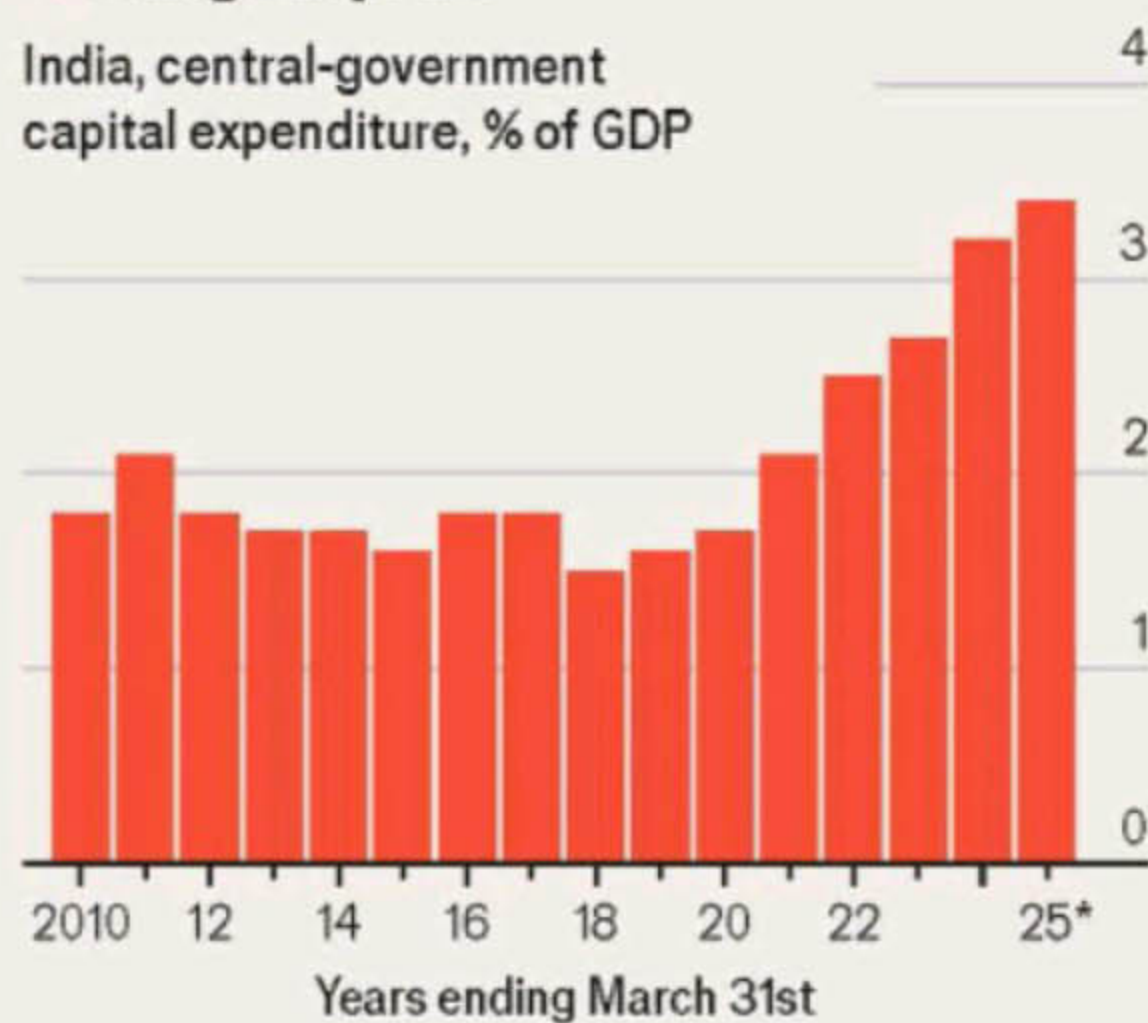
maximum governance". He scrapped India's centralised planning commission. Nehru, according to Pulapre Balakrishnan, an Indian economist, believed the public sector could be "an active agent of resource mobilisation", not the "flaccid employment-granting welfarist agency" it became after his death. Mr Modi has concluded that it can be both.

Mr Modi's reliance on public investment is, however, probably not



→ A big surprise

India, central-government capital expenditure, % of GDP



Sources: Haver Analytics; Ministry of Finance *2024/25 estimate

► sustainable. The government is keen to reduce its budget deficit, aiming to trim it to 4.5% of GDP in the 2025-26 fiscal year. It also has other claimants to appease. After the failure of Mr Modi's party to win an outright majority in elections in 2024, his government now depends on coalition partners, who may have expensive ideas of their own. So far the new government has resisted the temptation for crowd-pleasing handouts. But the pressure will grow if the ruling coalition suffers any setbacks in upcoming state elections. Both Delhi, the capital, and Bihar, one of the country's poorest states, go to the polls in 2025.

Given the government's constraints, investment spending must now come from companies. The coming year will reveal whether private firms agree. Many of India's big conglomerates seem ready to do their bit. S&P Global reckons Indian conglomerates could invest about \$800bn over the next ten years, almost three times the amount they invested over the past decade. About 40% of this will be in emerging industries such as green hydrogen, chipmaking, data centres and electric vehicles.

It should also become clearer in 2025 whether this mobilisation of capital will help mobilise labour. India's workforce is growing, but many people are stuck in unpaid jobs for small family firms. And millions who went back into agriculture during the covid-19 pandemic have yet to return to the cities.

Nehru's growth strategy was criticised for prioritising heavy industry, rather than light manufacturing and other labour-intensive sectors that could have absorbed more of India's vast, underemployed workforce. In July 2025, Mr Modi's term as prime minister will exceed 11 years and two months. At that point only Nehru himself will have enjoyed a longer continuous period in office. If Mr Modi is ever to catch India's first prime minister, he will have to create better-paying jobs for the voters who gave him his. ●

Indian conglomerates could invest \$800bn

Building it

MUMBAI

At last, a boom in Indian infrastructure

Leo Mirani Asia correspondent, *The Economist*

UPON TAKING office as India's prime minister in 2014, Narendra Modi immediately boosted infrastructure spending. Many state and local governments followed suit. The country desperately needed it. Urban infrastructure has endured years of neglect even as cities expanded in size and population.

Nowhere is this more so than Mumbai, the commercial capital. Home to 22m people, India's richest city had long been an embarrassment, with gridlocked roads, packed trains and an airport at capacity. In 2025 some of the city's new infrastructure projects will, at last, be complete.

Perhaps the most eagerly awaited will be the opening of new metro lines. One that will connect the city's southern tip to other business districts and the airport is expected to be fully operational by the end of 2025. It will be Mumbai's first mass-transit link to the existing airport.

Another much-anticipated project is a coastal road running along the city's west coast, part of which opened in 2024. The plan is to use the road, built on reclaimed land, to link the west with a bridge on the east of the city, in turn connecting the Mumbai peninsula to the mainland. The 10km road will be completed in 2025, with 175 acres of new parks and seaside promenades alongside it.

Arguably the most impressive infrastructure project to open in 2025 will be a vast new airport on the city's outskirts. Mumbai's existing airport has just one usable runway and is in the middle of the city.

The completion of these megaprojects will build upon a spate of ribbon-cuttings in 2024. More are on the way, including a high-speed rail link to Ahmedabad, an economic hub, and a motorway to Delhi, the capital.

To pay for all this, and similar projects across the country, India has in recent years turbocharged public investment. A record 11trn rupees (\$130bn), or 3.4% of GDP, has been set aside for infrastructure in the year to the end of March 2025, three times the annual amount of a decade ago. Much more spending and building will be necessary to expand India's economy and boost the living standards of its people. But the pace is picking up.



↑ No jams tomorrow

Japan's 2025 problem

TOKYO

The issue of ageing will come to the fore

Noah Sneider East Asia bureau chief, *The Economist*

THE NOTION of a greying Japan is nothing new. But 2025 is when the country will really start to feel its age. Japan's baby-boomers, some 7m-8m people known as the *dankai*, born between 1947 and 1949, will all be 75 or older. The total number of over-75s will reach nearly 22m, up from 17m a decade ago. The growth in ever-crippier old folks will ripple through Japan's social systems, pushing up health and pension costs while the tax base shrinks. The government projected in 2018

that overall social-security costs, including pension payments, will increase by nearly 60% between 2025 and 2040. Policymakers refer to this as the "2025 problem".

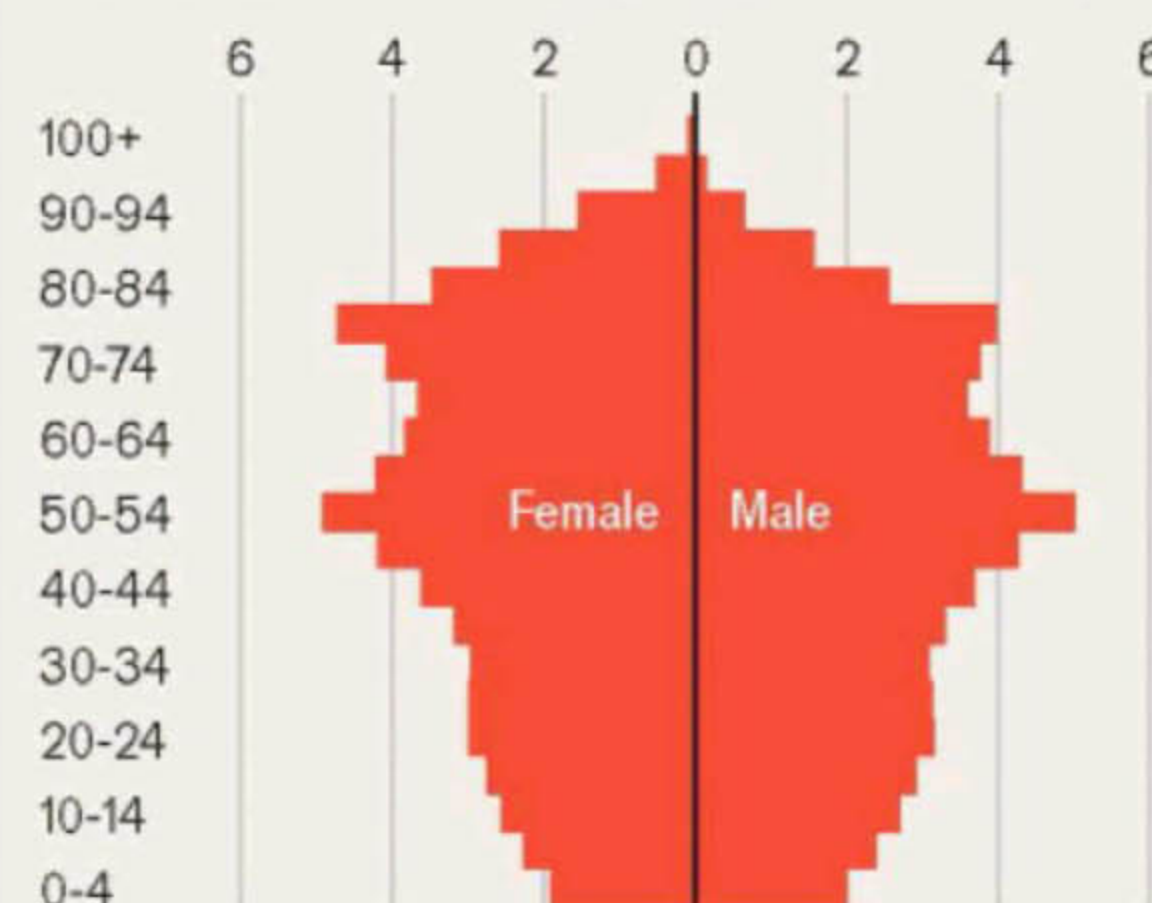
In most countries, being seen as "elderly" tends to start at 65 years old. But in Japan many people remain *genki*, or full of life, long after they are officially "old". More than half of those aged 65-69 and more than one-third aged 70-74 are employed. Most are healthy enough to live independently. Just 3% of those aged 65-74 require nursing care. The Japanese gerontological association has suggested reclassifying those aged 65-74 as "pre-old".

On turning 75, however, problems begin to mount. Labour-force participation drops to 12%. Health-care costs increase precipitously. The share of the population requiring nursing jumps to 12% for those aged 75-84, and to 45% for those over 85. In Japan the over-75 cohort is known as the "advanced elderly".

The government has tried to manage by making tweaks, such as expanding the construction of care homes. It has loosened restrictions on migrant workers and is recruiting more caregivers from South-East Asia. An overhaul to the

→ Inverted

Japan, population by age group, 2025 forecast, m



Source: UN Population Division

pension system is scheduled for 2025.

Such measures will help, but bolder reforms and greater honesty from politicians will also be necessary. The share of the population over 75 was below 20% in every one of Japan's 47 prefectures in 2020. In 2025 it will be above 20% in 16 of them. By 2050 it is projected to be over 20% in all but one. The advanced elderly, canes and walkers in hand, are on the march. ●

Unpopularity contest

SYDNEY

Australia is probably heading for a minority government

Eleanor Whitehead Australia and New Zealand correspondent, *The Economist*

IF AUSTRALIANS MADE one thing clear at the most recent federal election in 2022, it was that they were fed up with the major parties. The conservative Liberal Party, which had been in power for nine years in coalition with the smaller National party, suffered the worst result in its history. But because the Liberals lost eight seats to Greens and green-minded independent candidates (known as "Teals"), the left-leaning Labor Party, the main opposition, edged into power only narrowly. Less than a third of voters backed Labor.

Australians are just as glum about their next election, which is expected by May 2025 and could be sooner. It will pit the Labor prime minister, Anthony Albanese, against Peter Dutton, from the right wing of the Liberal Party. Conservatives regard

"Albo" as weak; progressives see Mr Dutton as nasty. Both are unpopular with voters. Analysts reckon that Australians will end up with a minority government, possibly led by Labor with the support of Greens, Teals and independents.

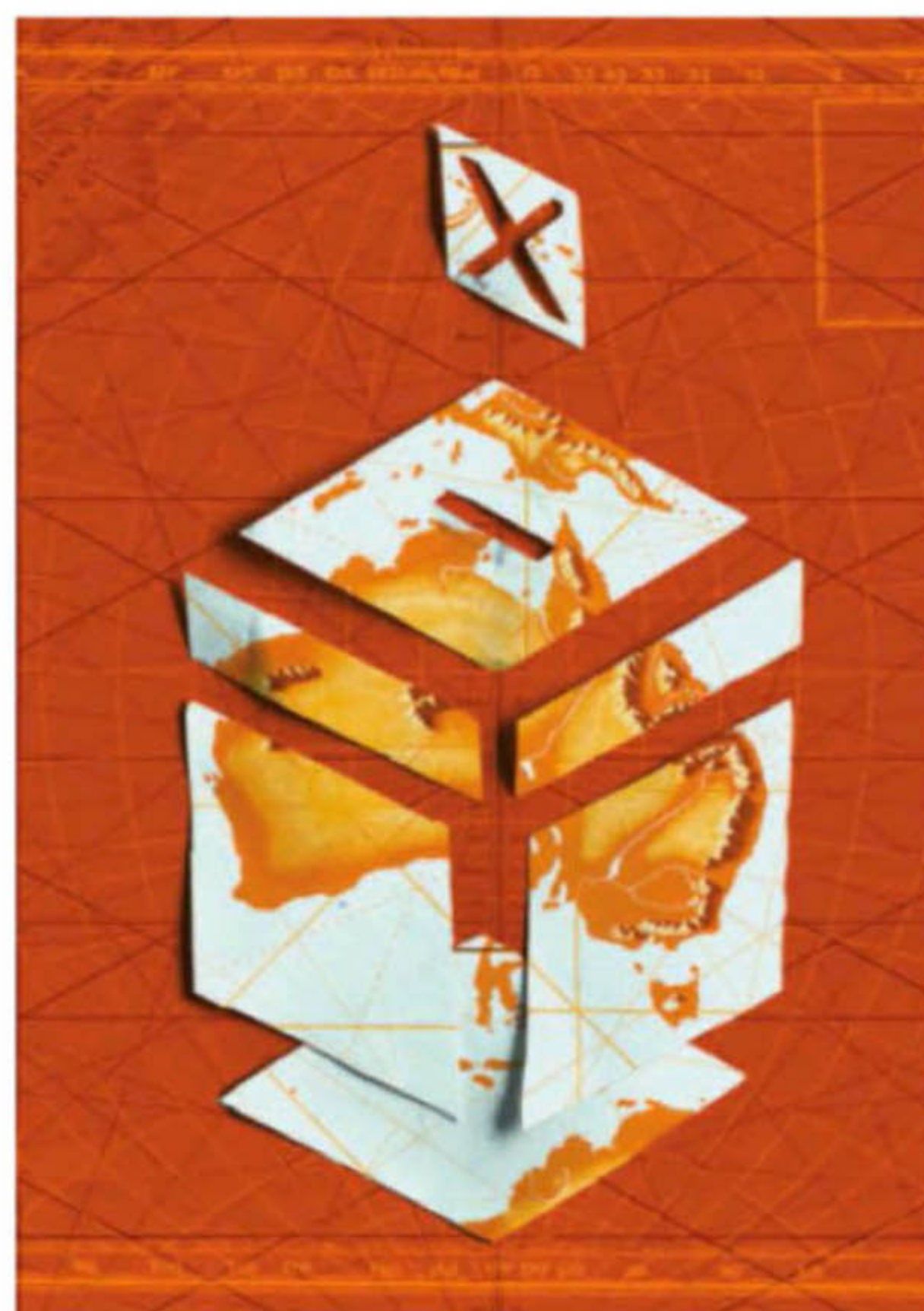
Part of the problem is that Labor's record is thin. In 2022 it ended years of paralysis over Australia's climate policy, passing a law that imposed legally binding targets to reduce emissions. In foreign

policy, it has managed to patch up Australia's trading relationship with China, while countering China's growing influence in the Pacific. Yet much of its term was consumed by a botched campaign for a "Voice to Parliament", an advisory body to represent the views of indigenous communities. Australians voted against the idea at a referendum in 2023. What lingered was a feeling that the government was out of touch on what voters cared most about: the economy.

That is what will dominate the coming election. Inflation has proved hard to tame, and high interest rates have hurt indebted homeowners. Australians are also angry about a worsening housing crisis.

The Liberals ought to be able to capitalise on those frustrations. But the party has alienated many of its traditional voters by veering hard to the right on issues such as climate change. It lost almost all its urban seats in 2022 and may struggle to form a government without winning back support from educated urbanites, especially women.

Memories of the last hung parliament, in 2010-13, still cause pain. Julia Gillard, Labor's then prime minister, was pressed by the Greens to introduce a carbon price. The policy worked, but the Liberals labelled it "a great big tax on everything" and Labor was trounced at the next election. No one likes a hung parliament, but a fragmented, frustrated electorate means there may be no escaping it. ●



Echoes of 1949

SINGAPORE

Could Myanmar's junta fall in 2025?

Aaron Connelly Asia diplomatic editor,
The Economist

JUST A YEAR after Myanmar declared its independence from Britain in 1948, the new government's authority extended no farther than the suburbs of Rangoon (now Yangon). Though beset by insurgencies and defections, the army fought its way out of the capital to conquer most of the country. For 75 years, no other institution has had its reach or resilience.

But in 2024 the Tatmadaw, as the army is known, suffered its worst reversals on the battlefield since the early years. First it lost control of most of the crossing-points on its border with China. Then it lost most of the roads needed for trade with its neighbours. Increasingly it is on the back foot in the centre of the country. The fighting has come to the doorstep of the military regime: the hill station of Pyin Oo Lwin, where the army trains its officer corps. For the first time since 1949, defeat of the Tatmadaw does not feel impossible.

The latest uprising began after the army seized power from the democratically elected government of Aung San Suu Kyi in February 2021. The ethnic Bamar majority,

which mostly lives in the central lowlands, poured into the streets to protest. When the army began to shoot them, they fought back, with training and equipment sourced from ethnic armed groups.

The biggest winners in 2024, however, have not been brave young protesters. Rather, a coalition of ethnic armed groups known as the Three Brotherhood Alliance now governs swathes of the Shan Hills between Mandalay and China, and nearly all of Rakhine state in the country's west. They are disciplined and experienced fighters, but have little time for democracy. One group, the Arakan Army, is accused of atrocities against the Rohingya, a Muslim minority in Rakhine state.

China has long offered the Brotherhood groups support, funnelling arms through third parties and giving them access to Chinese territory and markets. It gave the Brotherhood's offensive in 2023 a green light because it was frustrated with scam centres, targeting Chinese citizens, being run from the territory of the junta's proxy forces on the border.

Analysts say China helped weaken the Tatmadaw to eradicate its scam centres, but does not want it to collapse. Now that the Brotherhood groups control significant territory and economic activity, China has less influence and might start to back the junta to keep it from failing.

The regime is under pressure in other ways. It has lost sources of revenue and its currency is depreciating. Cohesion within the Tatmadaw now depends on coercion. Some officers mutter that they would defect, if they could get their families out. Defections and Chinese interference brought the army to the brink of collapse in 1949. The question in the coming year is whether that could happen again. ●

Indonesia at a crossroads

SINGAPORE

Lofty growth goals will not be realised

Ethan Wu Asia correspondent,
The Economist

ASIA'S BIGGEST economy, China, moves mountains to attain 5% growth. South-East Asia's biggest economy, Indonesia, is doing it with ease. Its growth rate has been around 5% for most of the past three decades. For a middle-income country, however, this is mediocre, and Indonesia's politicians have long sought more. The new president, Prabowo Subianto, who took office in October, has promised 8% growth within five years.

To achieve this, the former general plans to spend. Some of his ideas are wasteful, such as expanding the number of government ministries (there are already 34). His flagship campaign pledge, to give Indonesia's 83m schoolchildren free lunch, shows more promise. The logistics look hard, however, especially for Indonesia's often unco-ordinated and corruption-plagued bureaucracy.

Financing is in doubt, too. Mr Prabowo's aides have earmarked 71trn rupiah (\$4bn) in the coming year, but analysts fear cost overruns. Raising taxes in Indonesia is arduous. The total tax take is 10% of GDP, half the regional average. According to the World Bank, more than half of Indonesian workers are informally employed, which is a lot even by developing-economy standards.

Mr Prabowo thinks Indonesia should borrow more. That could require changing the law: Indonesia's fiscal-restraint rules cap debt and deficits at 60% and 3% of GDP, respectively. These limits have kept the country's bonds investment-grade, and kept investors calm. The country's deficit, at 2.7% of GDP, is just shy of the fiscal limit, so a big unfunded spending binge would breach it. But Mr Prabowo's hard-charging, authoritarian tendencies suggest he is not afraid of testing limits.

Achieving 8% growth will require deeper changes. Mr Prabowo has gestured towards overhauling state-owned enterprises and improving tax collection, but details are sparse and previous efforts have been derailed. Unless reforms can gain momentum, Indonesia's growth may remain stuck at around 5%. ●



China



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New president, new dangers

Donald Trump will challenge China, but his return also presents opportunities

Roger McShane China editor, *The Economist*

HE IS KNOWN as Comrade Jianguo on Chinese social media. But this nickname for Donald Trump is not an expression of solidarity. The term *jianguo* means “build the nation”. Chinese netizens are referring to their own country. The sobriquet reflects a view that the new president is so bad for America that he is good for China.

Some members of China’s political elite espouse a more refined version of this view. They judge Mr Trump to be intellectually incurious and, above all, self-interested. His re-election is seen as further evidence of America’s decadence and decline. That

provides China’s rulers with an opportunity to push their vision of how the world should be run. But they know, too, that Mr Trump poses real dangers—not least for China’s struggling economy.

During his presidential campaign Mr Trump often painted China as America’s economic nemesis and threatened to impose tariffs of 60% on its goods. If he follows through, that would knock 2.5 percentage points off Chinese economic growth over the subsequent year, projects UBS, a bank. But it is unlikely. The threat of enormous levies should be seen as a negotiating ploy—to be taken seriously, not literally—say Mr Trump’s advisers. The businessman from New York is all about making deals.

China can ill afford a trade war of any size. Since emerging from the pandemic, its economy has underperformed. Chinese entrepreneurs are disillusioned with a government that is obsessed with security, unpredictable in its rulemaking and enamoured of its own central planning. Bold stimulus is needed to revive sentiment and spending, and to reverse a slump in the property sector, which accounts for a fifth of GDP. But China’s rulers keep disappointing investors with timid and incomplete policies.

It may be that the Chinese government is saving its fiscal firepower in case Mr Trump acts rashly. But it already has plenty to worry about. The new administration in Washington will continue the policy of impeding the flow of Western technology, such as advanced chips, to China. These restrictions aim to hinder the modernisation of China’s armed forces—

▶ and to ensure that America has an upper hand in the industries of tomorrow, such as artificial intelligence and quantum computing. The measures make it harder for China's ruler, Xi Jinping, to cultivate his own "new productive forces", or cutting-edge technologies that he hopes will drive economic growth.

If Mr Xi's frustration grows, there is a risk that China will become more aggressive. It is already forcefully pushing its grandiose territorial claims in the South China Sea, challenging Malaysia, Vietnam and the Philippines. They, in turn, have pushed back. The Philippines, an American treaty ally, has been the most assertive of all. Its sparring with the Chinese coast-guard around disputed shoals has raised fears in Washington that things could escalate out of control.

Tensions are also rising around Taiwan, the self-governing island of 23m people that China claims. China is dismayed by the provocative language of its independence-minded president, Lai Ching-te. It is deploying more air and naval craft around the island. In recent years, America has increased its arms sales to Taiwan and urged it to revamp its defences to prepare for Chinese aggression. But Mr Trump has intimated that he might not send American sailors, soldiers and airmen to defend Taiwan if China attacked.

It is difficult to square that with Mr Trump's selec-

Mr Xi sees China hawks everywhere in Washington

tion of China hawks, such as Marco Rubio and Michael Waltz, for top jobs in his administration. But the administration is unlikely to be tested in this way. China is not yet ready for a war that might involve America.

Officials in Beijing will look for other ways to take advantage of Mr Trump's unilateralism and his disregard for America's friends and allies. They will try to drive a wedge between America and European countries, which Mr Trump might also hit with tariffs. And they will continue to promote China as leader of the global south, claiming to be benevolent while criticising American bullying.

Some Chinese officials fantasise that Mr Trump, ever the salesman, might pursue a grand bargain with Mr Xi—one that takes in trade, Taiwan and other sources of tension. But there is so much else that divides the two countries, from China's export of chemicals used to make fentanyl, which kills thousands every year in America, to a hacking campaign that aims to give China the ability to wreak havoc on America's critical infrastructure.

Then consider the perspective of Mr Xi, who sees China hawks everywhere he looks in Washington. A crisis seems much more likely than a deal. Any number of things might lead to one in 2025. But that was true regardless of who won America's election. ●

Cities of the future

BEIJING

Why China's second- and third-tier cities are thriving

Gabriel Crossley China correspondent, *The Economist*

UNTIL VERY recently, China's young people, investors, consumers and creators flocked to just four cities: Beijing, the capital; Shanghai, a financial hub; Shenzhen, a tech centre; and Guangzhou, an export powerhouse. With giant populations, superior public services and gleaming infrastructure, these were dubbed "first-tier" cities by the government. But in 2025 China's smaller cities will start to steal their thunder.

First-tier cities are losing their lustre. They have become unaffordable for most Chinese: median house prices are typically 30-40 times higher than median incomes. They also have a poor quality of life, with many companies demanding a "996" work schedule (9am-9pm, six days a week). Underpaid and overworked, their residents are spending less amid China's economic slump. Profits in Beijing's restaurant sector fell by nearly 90% in the first half of 2024.



↑ *Chengdu rising*

Many second- or third-tier cities, meanwhile, are on the up. Their infrastructure is top-notch, housing is relatively cheap and the pace of work is more relaxed. Their economic growth often outpaces the national average. And by Western standards, they are still giants: many have populations of over 10m, and are still growing rapidly. Beijing and Shanghai, by contrast, are now shrinking.

In 2025 it will be consumers in smaller cities who will keep businesses afloat. With lower living costs, they can afford to splash out. Little wonder that coffee shops

and electric-car dealers are springing up on smaller cities' streets. Yum China, which operates KFC, a fast-food chain, plans to add several thousand new outlets by 2026, more than half of them in smaller cities.

In the coming year smaller cities will attract more young people. Surveys suggest that white-collar workers are increasingly sick of the tier-one grind. In the summer 12m students will graduate from China's universities. Many will look for jobs, not in Beijing and Shanghai, but in cities like Changsha and Nanjing—provincial capitals with vibrant cultural industries. Both are attracting lots of livestreamers, musicians and artists.

Talented young people will help China's smaller cities make technological progress, too. Take Hefei, a former backwater in eastern China's Anhui province. Thanks to government investment and private enterprise, it now has a thriving tech sector, with industries like high-end manufacturing, biotech and semiconductors. In the coming year officials will focus on developing its "low-altitude economy", China's preferred term for delivery drones and flying taxis.

Smaller cities can offer a more relaxed political atmosphere, too. Chengdu, a city in the south-west, is known for its teahouses, laid-back lifestyle and counter-cultural music. It is increasingly drawing liberal-minded young people from first-tier cities. Behind closed doors, some may air grievances about how the country is run. That is one area, though, where the supremacy of the capital, Beijing, remains unchallenged. ●

Reefs and beefs

Asian nations are pushing back against China in the South China Sea

Jeremy Page Asia diplomatic editor, *The Economist*

IN EARLY 2024 Taiwan looked like the most dangerous flashpoint in Asia. China, which claims the self-governing island as its own, was frustrated by Lai Ching-te's victory in a presidential election there in January. It had branded him a "dangerous separatist" who could provoke war. Soon after his inauguration in May, Chinese forces staged two days of naval and air drills around the island, putting military commanders on edge in America, bound as it is, by law, to help Taiwan defend itself.

In 2025 the focus of concern may shift southward. In the South China Sea, long-running friction over disputed rocks and reefs has escalated into dramatic clashes at sea. They have mostly occurred between Chinese and Philippine coastguard vessels. But with neither side willing to back down, such encounters could quickly escalate into a naval confrontation that might suck in America, a treaty ally of the Philippines.

One place to watch is Sabina Shoal. The outcrop in the Spratly Islands lies 150km west of the Philippine province of Palawan, but is also claimed by China, Vietnam and Taiwan. No claimant has a long-term presence. But the Philippines stationed its largest coastguard vessel at the shoal for five months in 2024,



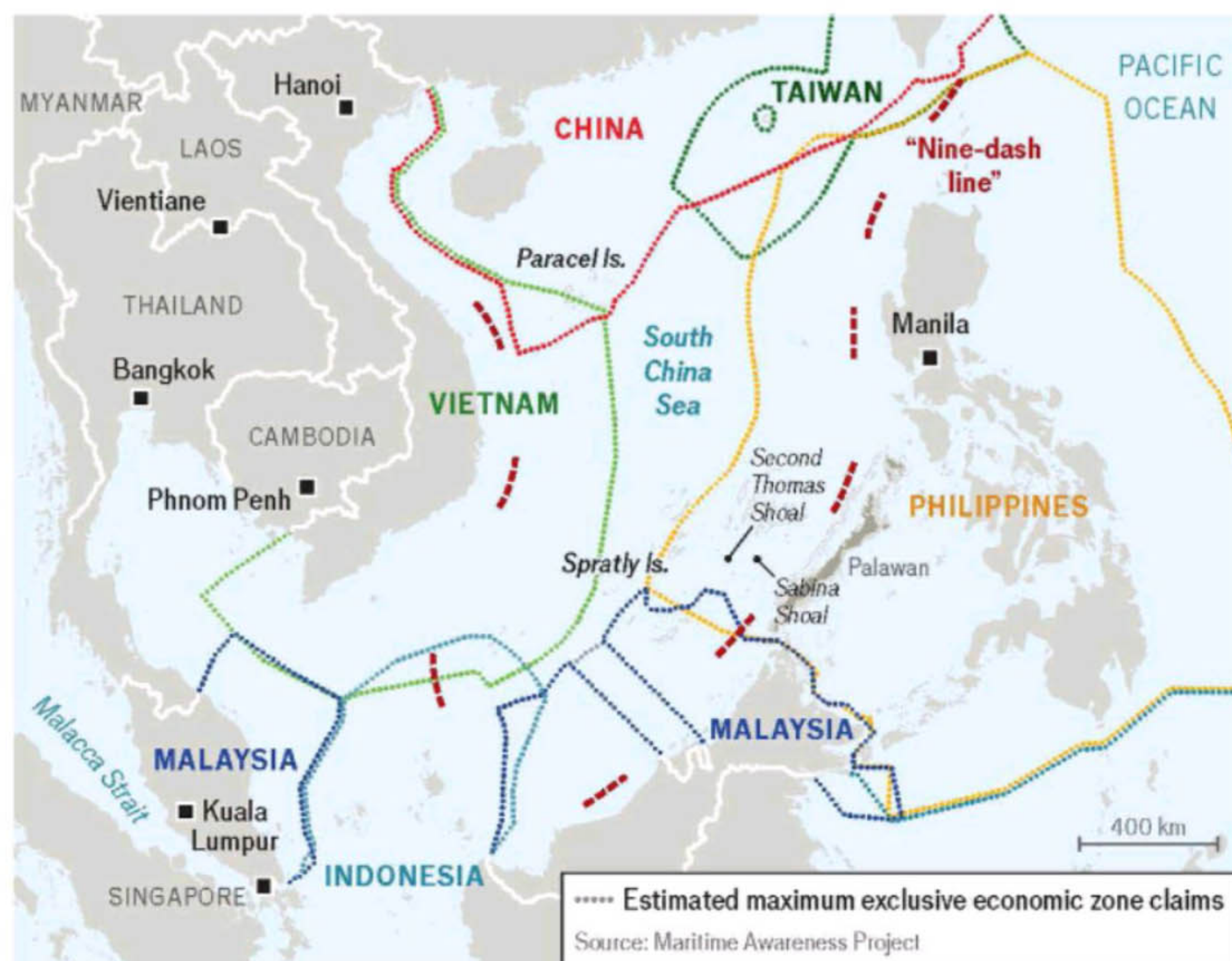
alleging that China was about to start building there. China sent its own ships in response, one of which rammed the Philippine vessel. The Philippines withdrew its ship in September but has promised continuous patrols there.

Second Thomas Shoal, also in the Spratlys, is another possible flashpoint. The Philippines has controlled it since 1999, when it grounded an old ship there. In 2023 it started trying to take in building materials to reinforce the hull. China responded with a blockade and by disarming a Philippine navy mission to break it in June. The two sides have since reached an agreement whereby China "inspects" all shipments—from a distance—to ensure no construction materials are brought in. How long this will last is unclear.

The outcrops involved may seem too small and remote to be worth risking a broader flare-up. Yet each side has cause to stand firm. The Philippines' president, Ferdinand "Bongbong" Marcos, has pledged to do more than just protest against Chinese encroachment in waters claimed by his country. America is also determined to reinforce its treaty with the Philippines and to stop what it calls Chinese "salami-slicing"—small acts of aggression that make territorial gains. China sees the chance to show America's allies that they cannot rely on it for help.

There are signs that other countries are becoming more assertive. Vietnam has been dredging and reclaiming land on features it occupies in the Spratlys. By June 2024 it had built up about half as much land as China did during construction of seven new military bases in the Spratlys in 2013-16. It also appears to be building a second airstrip. Even Malaysia (which is generally averse to confronting China) has expanded hydrocarbon exploration in disputed waters.

What happens will depend, in part, on how Donald Trump's administration views the problem, and the relationship with China more broadly. Relations over the reefs could get rockier still. ●



Innovation's stormy seas

SHANGHAI

Entrepreneurs in China must navigate an unpredictable environment

Don Weinland China business and finance editor, *The Economist*

ALL MANNER of consumer-electronic devices pass through Shenzhen's markets. The southern Chinese city is at the centre of one of the world's densest industrial clusters for electronics manufacturing. More recently some costly parts have been making their way through the markets—but these objects can only be manufactured overseas.

They are the ultra-powerful artificial intelligence (AI) chips designed by Nvidia, an American company, and manufactured in Taiwan by TSMC, the world's leading chipmaker. A single chip can go for well over \$30,000 when purchased from its maker; on the black market they fetch far more. And tech companies from across China are flocking to Shenzhen to get their hands on them.

What does this thriving black market reveal about Chinese entrepreneurs in 2025? It shows that they face many challenges: President Joe Biden's ban on high-powered AI chips, introduced in 2022 and since tightened, is just one example. Chinese chipmakers struggle to make comparable wares, which has forced those in the country's burgeoning AI scene to pay higher prices. Yet at the same time the shortage of powerful chips has forced AI startups to innovate and find ways to do more with less, highlighting the inventive

nature of China's entrepreneurs.

Unexpected shifts in domestic regulation are another hazard that innovators have been forced to navigate. In recent years fintech and consumer-tech barons have faced sudden clampdowns as Xi Jinping, China's supreme leader, has tried to steer innovation towards fields that he considers strategically more valuable. The prospects for giants such as Alibaba in e-commerce, and Tencent, a gaming and social-media colossus, have darkened. Unicorns, or unlisted companies valued at more than \$1bn, have also been losing their horns as China's economy faces greater economic pressures. In 2024 even Mr Xi asked underlings where all the unicorns had run off to.

But new champions are rising. Companies such as BYD, a maker of electric vehicles (EVs), Longi, a solar-power firm, and Cambricon, which makes AI chips, are the current stars of China's tech scene. The message from Mr Xi has been clear: the government wants entrepreneurs and investors to focus on the next wave of emerging technologies.

These include advanced chips, robotics and AI; new kinds of green technology (see next story); and even fringe areas such as flying taxis and brain-computer interfaces. The Communist Party has stressed the importance of self-sufficiency for many years and has done much to support local innovation, particularly in the chipmaking industry.

Expect the buzz around this new generation of Chinese technology firms to intensify in 2025. Autonomous taxis, for example, are operating in a handful of American cities, but are on the verge of widespread commercialisation in China. Hubs (or "vertiports") for flying taxis, which have yet to take off in the West, are opening in cities across the country; passengers may start whizzing between Shanghai and nearby cities in 2025. And even remote Chinese counties will have EV charging stations by the end of the year.

The weakness of China's economy will bite harder in the coming months, however. Many of these impressive technological leaps will be bankrolled by the state at a time when local governments are finding it harder to pay the bills. As flying taxis lift off in some cities, bus services may halt in poorer regions. Consumer confidence will remain low if China's leaders cannot fix the country's ailing property market; households may hold off on buying an EV, even if they are able to charge one.

And no matter how much Mr Xi would like to isolate China from the American political cycle, Donald Trump's return to the White House, with his plan to impose tariffs on Chinese goods, is likely to pose fresh challenges to China's storm-tossed army of innovators. ●



Post-solar power

BEIJING

China hopes to dominate the next phase of green innovation

Gabriel Crossley China correspondent, *The Economist*

CHINA HAS revolutionised some green technologies in recent years. Spurred by generous government subsidies and cut-throat competition, its companies worked out how to make solar panels, batteries and electric cars efficiently and ever more cheaply. Today China dominates global production of all three. Cheap Chinese technology, now being rapidly rolled out across the world, is helping to decarbonise electricity production, road transport and more.

The next phase of green innovation, though, is trickier. Cement factories, chemical plants and steel mills—all big sources of carbon emissions—need large amounts of heat to work, and burning fossil fuels is still the most practical way to provide it. Big ships and planes, meanwhile, are difficult to power with batteries. Reducing emissions from these so-called "hard-to-abate" sectors may require new technology. In 2025 Chinese firms will increasingly be trying to develop it.

One approach is to capture the carbon ►►

→ Smaller boats

China, new startups valued at \$1bn or more



Source: PitchBook

*To October 10th

Semiconductors' enormous growth potential

The future is being built on a foundation of sophisticated technology, and Tokyo Electron Ltd (TEL) is playing a pivotal role in this revolution. We speak to Toshiki Kawai, TEL's chief executive, to discuss how his company is facilitating advances through investment in "Technology Enabling Life".

"The AI-driven era has just begun, and the market's growth potential is enormous."

How is the evolution of transformative technologies that improve our daily lives affecting the outlook for the semiconductor industry?

Electronic devices, the internet and social networking have created vast amounts of data. The future AI-driven market will unleash the potential of this data collected through past decades.

The recent drastic improvement in devices' cognitive capabilities has been possible because of innovations in semiconductor technology, which enable advanced applications that will define the future. These also include virtual reality, including digital twins, and autonomous driving.

These advances are enlarging the market for semiconductor devices, which is expected to grow to over \$1trn by 2030, about twice the current size. A new phase of evolution lies ahead, with technologies like quantum computing, 6G/7G and Industry 5.0 coming in a few decades. According to Ajit Manocha, president and chief executive of industry association Semiconductor Equipment and Materials International, by 2050 the market could be as big as \$5trn. The AI-driven era has just begun, and the market's growth potential is enormous.

With the semiconductor market expected to grow, how does TEL intend to achieve its mid-term management plan?

We have set targets of achieving sales of more than 3trn yen, an operating margin of more than 35% and a return on equity of more than 30% by the fiscal year ending March 2027. To reach this goal and grow further, we will leverage our capabilities to create value-added products and services. Our strengths include being the world's only company that makes equipment for all four consecutive semiconductor manufacturing processes: deposition, coating/developing, etching and cleaning. We also have the number one or two market position in all equipment segments. Our coater/developer connecting with an extreme ultraviolet exposure system has



Toshiki Kawai
President and chief executive, Tokyo Electron Ltd

almost 100% market share. And we have high-performance equipment in fields such as semiconductors for generative AI, where high capacity, speed and reliability, and low power consumption, are imperative. It might be said that all semiconductors used worldwide pass through our equipment.

This advantage rests on about 23,000 registered patents as of March 2024. To further sharpen our edge, we plan to invest more than 1.5trn yen (\$10.5bn) in research and development, and more than 700bn yen (\$4.9bn) in capital expenditure, over the next five years.* We also plan to recruit a total of 10,000 employees globally in that time.

"Semiconductors have a crucial role to play in uniting digitalisation and decarbonisation."

ADVERTISEMENT

What are the major needs to be addressed by semiconductor manufacturers as they develop advanced processors, and what approaches is TEL taking to support them?

We must urgently propel the continuous technological evolution of semiconductors in four key aspects: higher capacity, speed and reliability, and lower power consumption.

Power efficiency and digitalisation help to mitigate environmental challenges. Developing the conditions for more people to work and meet remotely, or to receive more remote support in fields such as health care, could drastically reduce CO2 emissions from travel. Innovations in semiconductors have a crucial role to play in uniting digitalisation and decarbonisation.

How we do this in manufacturing is through scaling and advanced packaging. A current state-of-the-art GPU—a kind of processor that can perform AI functions—contains about 80bn transistors, each 4nm wide. We foresee that this will scale down to 2nm within five years, increasing power efficiency, and the number of transistors will rise to 480bn. At the same time, the high-bandwidth memory modules used for generative AI will evolve to have more than five times the capacity. Advanced applications will demand this higher performance.

Please tell us about how TEL as an organisation is adapting to boost performance and encourage continuous innovation.

Our employees drive the realisation of our goals, and a key to their motivation is the feeling that their work and their company are offering important value to the world. We make it clear how they contribute to progress by setting out our vision, “A company filled with dreams and vitality that contributes to technological innovation in semiconductors”, based on the idea of “creating shared value” advocated by the American management scholar Michael Porter.

As a measure to value our products and services, we place great importance on pursuing profit. Simultaneously, we make the most of our company’s expertise to achieve social, economic and corporate value through business activities.

While demand for semiconductors continues to grow, securing human resources and developing their skills is a significant challenge. If current trends of technological innovation accelerate further and this rapid pace of market growth continues, competition for people will likely intensify. Our corporate

growth is enabled by people, and our employees both create and fulfil company values. Therefore, our company is committed to motivation-oriented management, which incorporates awareness that our company and work contributes to society, the dreams and expectations of the company’s future, opportunities to take on challenges, globally competitive compensation and fair personnel practices, and a workplace with an open atmosphere. As a result,

What initiatives will TEL take to achieve a sustainable and prosperous future?

The company celebrated its 60th anniversary on November 11th last year. We used the opportunity to create our vision and a corporate message, “Technology Enabling Life”. TEL is committed to pursuing technological innovation in semiconductors as a driver of sustainable growth.

For the environment, we have a programme called E-COMPASS. It consists of three pillars: accelerating our efforts to develop high-performance semiconductors with lower power consumption, reducing the environmental impact of the equipment used in manufacturing without compromising performance, and addressing environmental issues through our business activities. Through those activities, we are working towards net zero by 2040.

Everything we do fits into two themes: innovation and sustainability. Tokyo Electron will keep working for success in both digitalisation and decarbonisation.



“Everything we do fits into two themes: innovation and sustainability.”

TEL
TOKYO ELECTRON

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emitted by factories before it enters the atmosphere and to store it. This is technically possible; the problem is doing it cheaply enough to spur wide adoption. Chinese scientists have filed three times as many patents in “carbon capture and storage” (CCS) methods as their American counterparts. In 2024 Tencent, a tech giant, invested 100m yuan (\$14m) in a dozen promising CCS technologies. China Energy Investment, a state-owned company, is building a demonstration CCS project at a chemicals plant that aims to capture 1m tonnes of carbon a year by the end of 2025.

Hydrogen is another area of focus. It can be used to heat a steel mill or power a truck with no greenhouse-gas emissions. The difficulty is producing the gas in a clean way (making what is known as “green” hydrogen) rather than by using fossil fuels (“brown” hydrogen). This can be done using renewable energy to power a machine called an electrolyser, which

splits water molecules into hydrogen and oxygen. But at the moment the hydrogen produced in this way is still too expensive for most commercial uses.

China is well positioned to push costs down. It already makes about 40% of the world’s electrolyzers, and does so more cheaply than competitors. And thanks to years of splurging on solar panels and wind turbines, it also has plenty of renewable energy. Inner Mongolia, a vast region of northern China with abundant wind and sunlight, plans to make 480,000 tonnes of green hydrogen in 2025—not much compared with the amount of brown hydrogen China makes, but a start.

Other countries, including India and Brazil, also hope to become green-hydrogen superpowers. But China’s skill in building infrastructure will give it a further boost. Officials are building pipelines to transport hydrogen to industrial centres. Shenzhen, a tech hub in the south of the

country, already has a fleet of hydrogen-powered buses. By the end of 2025, it hopes to become China’s “hydrogen capital”, setting international standards for the nascent industry.

The success of such ventures matters a great deal to China. It intends to eliminate net emissions, and become carbon neutral, by 2060. But its steel industry makes as much of the metal as the rest of the world combined. Its chemicals and shipmaking industries, too, are the world’s largest.

These new green technologies would have more than just domestic appeal, however. They would also create valuable new export markets. Chinese progress in these areas will lead to more grumbling from its trading partners. Western firms are already struggling to compete with China’s existing green tech. Some worry that the global energy transition has become too dependent on China. It may soon become even more so. ●

A silver-haired lining?

China hopes to turn ageing into an economic asset

Alice Su Senior China correspondent, *The Economist*

CHINA’S POPULATION is shrinking and ageing, a process that will continue apace in 2025. The total fertility rate, or the average births per woman, has fallen to 1.1, far below the 2.1 needed to maintain a stable population. After a possible small post-pandemic uptick of births in 2024, the auspicious year of the dragon, the birth rate is expected to resume its decline. Meanwhile the number of people over 60 is expected to grow from 300m in 2023 to more than 400m by 2035—that is, from one-fifth to nearly one-third of the population. This bodes ill for China’s economy, with fewer young people working to support more old folks. But state planners think they have found a silver lining: the “silver economy”.

In 2024 China’s State Council issued a policy document on promoting a “silver economy to improve the well-being of the elderly”. It called for companies to invest in elder-friendly industries such as smart health care, anti-ageing products, personal pensions and tourism. “Promote theme



products such as nostalgic tours and youth tours,” it recommended. The state has also called upon local governments to develop better services for old people, such as meal deliveries, at-home health care and cultural-enrichment activities.

The focus on silver-haired spenders makes sense. The ageing society will have massive needs—and the coming generation of retirees will have money to spend. The UN estimates that the largest age cohort, aged 50-60, includes 230m people, most of whom will retire in the next decade. “They are the most wealthy sector of society,” says Tim Xie of Quantasing, an educational-technology firm that pivoted to focus on the silver economy in 2022.

Older Chinese tend to be more frugal.

But the growing cohorts of those in “new middle age” (45-60) and “old age” (over 60) are in a sweet spot in the middle, says Mr Xie. They spent most of their working lives in China’s boom years and are retiring with enough time to enjoy their savings.

Quantasing has attracted 120m users to its online courses, which help retired people develop hobbies such as calligraphy, meditation and piano. Only 400,000 are paying customers so far, but Quantasing expects that number to grow as it expands into wellness products and tourism.

The China Research Centre on Ageing, a government think-tank, estimates that in 2024 the silver economy (ie, the value of providing services or selling goods to the old or nearly old) reached 7trn yuan (\$1trn), about 6% of GDP. It expects this to rise to 30trn yuan by 2035, or around one-tenth of GDP, and to one-third of GDP by 2050.

Chinese companies are already responding. Registrations for new silver-economy enterprises grew by more than 40% from 2019 to 2023, according to Qichacha, a business-data platform.

There are challenges to developing the silver economy. The elderly are susceptible to scams. They will need consumer protection, even as the government encourages firms to sell them as much as possible. Chen Gong of Peking University warns that too many firms may be piling in without enough thorough research. “Many policies are shouting a lot but doing little,” he says. Cai Fang of the Chinese Academy of Social Sciences points out that more welfare and social services for the elderly are needed. Silver-haired spending is bound to grow. It will be tougher to make sure that the well-being of China’s old folks grows along with it. ●

Middle East & Africa



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Now what?

The outlook for the Middle East depends on three cantankerous old men

Gregg Carlstrom Middle East correspondent,
The Economist

WHEN THE Gaza war began in late 2023 even some Israeli generals thought it would be finished within two or three months. Few observers thought it would drag on for more than a year. Fewer still predicted the swift decapitation of Hizbullah, the Shia militia based in Lebanon, or the back-and-forth bombardment between Iran and Israel. During 2024, assumptions that had seemed to govern the region for decades collapsed within months.

War will continue to shape the Middle East in the coming year. Even the best-case scenario is a bleak

one: that the regional conflict grinds to a halt, but the destruction and displacement it caused remains a problem for many years. The fighting may not end, though. Instead it could expand and shatter a fragile detente in the Gulf. Which way the region goes will depend largely on three cantankerous old men: Ali Khamenei, Binyamin Netanyahu and Donald Trump.

The first two have been consistent. Mr Khamenei, the supreme leader of Iran, is nervous about direct conflict with Israel but also willing to risk it for the first time in Iran's history. The ballistic-missile barrage he approved in October is unlikely to be the last. As for Mr Netanyahu, the Israeli prime minister, he is determined to strike harder not just at Iran's proxies but at Iran itself. The wild card is Mr Trump.

Optimists hope that he will not want a war hanging over the start of his presidency. If pushed towards a ceasefire, Mr Netanyahu would be unlikely to defy Mr Trump. The prime minister cannot ignore him the way he did Joe Biden. But that will be cold comfort for Palestinians and Lebanese.

By some accounts more than 10% of Gaza's 2m people have already fled, often paying huge sums of money to reach Egypt. That exodus will continue in 2025. Those who remain in Gaza will spend much of the year huddled in tents and makeshift shelters. Reconstruction will be slow, if it begins at all. Mr Netanyahu will continue to dismiss talk of post-war arrangements in Gaza.

Mr Trump may be more attentive to Lebanon, if only because he now has a Lebanese son-in-law. But

► there, too, even if the war ends, many of its 1m displaced people (one-fifth of the population) have no homes to return to. Their prolonged displacement will aggravate sectarian tensions in a country that always worries about renewed civil strife.

And all of that assumes that the conflict comes to an end. Those hoping Mr Trump will improve the lives of the Palestinians in Gaza may be disappointed. History suggests he will not pressure the Israeli prime minister. Mr Trump showed little concern for the plight of the Palestinians during his first term. Israel's right-wing government will probably move ahead with its de facto annexation of the occupied West Bank. In Lebanon, the Israeli army is keen to end the fighting, but that will require a complicated diplomatic agreement in which Hizbullah agrees to pull back from the border. Without such an agreement, mission creep will remain a risk. Instead of leaving, Israeli troops may push deeper into Lebanon.

The big question is whether the fighting will spread further. There is already a heated debate in Iran about whether to build a nuclear weapon. If the country can no longer deter Israel through conventional means, goes the thinking, then perhaps it needs the bomb. Mr Netanyahu would like American help to strike Iran's nuclear facilities. Mr Trump will be pulled between a hawkish wing of his party, which supports such a step, and an isolationist wing that wants to avoid getting too involved with another war in the Middle East.

There will be some other unlikely voices urging restraint. Mr Netanyahu, among all the regional leaders, has the strongest relationship with the incoming Trump administration, with Muhammad bin Salman, the Saudi crown prince, probably a close second. MBS, as he is known, will urge Mr Trump to rein in the regional war and avoid a conflict with Iran.

Though Iran remains a bitter rival to Saudi Arabia, the kingdom has rethought its hostility towards the Islamic republic. Faisal bin Farhan, the Saudi foreign minister, says his mandate is to "protect Vision 2030", his country's ambitious plan to overhaul and modernise its oil-based economy. Officials in other Gulf countries take a similar view. At the start of Mr Trump's first term, they pushed him to confront Iran; now they will push him to avoid confrontation.

For eight years, Arab-Israeli normalisation has been the focus of American policy in the Middle East. MBS will continue talking with America about such a deal, but he is unlikely to agree to one. He may now prefer to wait until others in the neighbourhood make a move: Bashar al-Assad, the blood-soaked Syrian dictator, might wonder if a quiet outreach to Israel will improve his standing in the West.

Other Arab states will be little more than bystanders. Economic problems will continue to fester across the region. Egypt, for example, managed to avoid a balance-of-payments crisis in 2024 only by securing an enormous investment from the United Arab Emirates—but its currency, already devalued four times since 2022, will probably sink again. (The dramatic reduction of shipping coming through the Suez canal, once a valuable source of revenue for Egypt, has not helped.) And Tunisia's economy will stagnate further now that Kais Saied, its erratic president, has won a second term in office.

Ultimately America, Iran and Israel will determine what happens next in the Middle East. Arab states will be watching nervously. ●

War and politics

JERUSALEM

For Binyamin Netanyahu, peace has its own risks

Anshel Pfeffer Israel correspondent, *The Economist*

IF THE GENERALS of the Israel Defence Forces had their way, the three wars Israel fought in 2024 would all have been over by year's end. They have restored Israel's deterrence, tarnished by Hamas's surprise attack on October 7th 2023. But as one of the generals puts it: "Soldiers fight wars; politicians decide when we've won." And politics means Israel's wars (in Gaza, Lebanon and against Iran) are likely to continue well into the new year.

Most of Israel's aims have been achieved. In Gaza it has dismantled Hamas's military structure. In Lebanon it has forced Hizbullah back from the border. Freeing Israeli hostages and ensuring Hizbullah does not return to the border can be achieved only through ceasefire deals, of which there is little prospect.

Binyamin Netanyahu, Israel's prime minister, is delaying. Hamas is prepared to release hostages only if Israel agrees to a full with-

drawal of its troops from two corridors within Gaza. Doing so, Mr Netanyahu claims, will give Hamas the chance to regroup. In Lebanon he demands Israel retain the right to strike Hizbullah at will.

Behind closed doors the generals grumble that Mr Netanyahu's position means a forever war on both fronts, and increases the chance Iran will launch more missiles. They say Hamas and Hizbullah will not want to risk further attacks on Gaza or Lebanon for a generation. Israel needs to rebuild as well.

But Mr Netanyahu insists that Israel is on the way to "total victory". His calculations are not just military. His far-right coalition partners have threatened to abandon his government if Israel withdraws from Gaza or Lebanon. An end to the war would almost certainly mean early elections and a reckoning for his previous failed policy of containing Hamas in Gaza, which ultimately led to October 7th. By delaying a ceasefire, he hopes to buy enough time to recover in the polls.

American politics matters too. Few American presidents have done as much for Israel as Joe Biden, but Mr Netanyahu is not about to allow him any credit for ending the war. Donald Trump's foreign-policy team will have to start afresh. That may prolong the war, and grant Mr Netanyahu more time in office.





Mr Khamenei and Mr Trump

Does an elusive handshake await?

Nick Pelham Middle East correspondent,
The Economist

SINCE 1979, the Islamic republic of Iran has brandished four core slogans: death to Israel, death to America, export the Islamic Revolution and “cover or suffer”, an injunction for women to veil. The regime’s resolve to implement them has waxed and waned, but it has never formally abandoned them. Without them, supporters of Ayatollah Ali Khamenei, the 85-year-old supreme leader, might ask, what remains of the Islamic republic?

The question now, though, is will Donald Trump accept anything less? Iran was not destined to clash with Mr Trump when he took office in 2017. He said he wanted a better deal than the Joint Comprehensive Plan of Action (JCPOA), negotiated by Barack Obama in 2015. Mr Trump sought restraints on Iran’s regional proxies, but what he wanted most was a photo-op with Mr Khamenei, like the one he staged with North Korea’s supreme leader, Kim Jong Un.

Much anguish might have been spared had Mr Khamenei flattered Mr Trump and hosted him in Tehran. Iran’s currency might have soared; its economy could have flourished, free of sanctions. But, even

though Mr Khamenei has been in power three times as long as Iran’s founder, Ayatollah Ruhollah Khomeini, the ghost of the founding imam still haunts him. So he retorted that Mr Trump was “not worthy of any message exchanges”.

His presidential vanity dented, Mr Trump withdrew from the JCPOA, enforced an oil embargo and had Iran’s most senior general, Qassem Suleimani, assassinated. In response, Iran accelerated its nuclear programme to the point of becoming a threshold state, and vowed revenge. The American government brought charges on November 8th against a man in connection with an alleged plot to assassinate Mr Trump before the election.

Does Mr Khamenei regret his decision? His allies and his economy are weaker now. Since 2016, the rial’s value against the dollar has fallen by over 95%. Mr Khamenei has swapped hardliners for pragmatists.

The supreme leader has also retreated on all four of his slogans. His president, Masoud Pezeshkian, speaks of a ceasefire and de-escalation with Israel. Mr Khamenei has signalled readiness to be friends with America. Iran is loosening its dependence on its regional proxies. And it has relaxed the enforcement of the veil.

But unless Iran agrees to abandon its regional ambitions many in Mr Trump’s circle will want him to tighten sanctions and the oil embargo. Some will urge him to push for regime change.

As he enters his second term, Mr Trump appears unconvinced. America, he said recently, must make a deal with Iran because the consequences of not having one were “impossible”. If Iran abandons its drive for nuclear weapons, Mr Trump said as he cast his vote on November 5th, “I’d like them to be a very successful country.” The question now may be whether Mr Khamenei can stomach that photo-op. ●

Pick a camel

Gulf leaders are trying to work with China and with the West

Anjani Trivedi Global business correspondent,
The Economist

THE GULF’S wealthy rulers spent 2024 doing two things: making their mark on the global technology map as they tried to move up the digital pecking order, and advancing their ambitious economic diversification plans. This involved partnerships with both the West and China, a tricky balancing act akin to trying to ride two camels at once. Going into 2025, however, the Gulf’s sheikhs and princes are coming under increasing pressure to choose one or the other.

When it comes to bolstering their technological ambitions, Gulf states have leaned towards the West. The United Arab Emirates (UAE), perhaps the most ambitious Gulf state when it comes to technology, drew in Microsoft as a partner for G42, a home-grown artificial-intelligence (AI) champion. Microsoft is also setting up an engineering centre in Abu Dhabi, and investing in AI infrastructure, along with Blackrock, the world’s largest asset manager, and MGX, an Emirati tech fund. Brad Smith, Microsoft’s president, calls this a “new model” for “geopolitical and economic collaboration” between the Middle East and the West. It is, he notes, primarily a “government-to-government relationship, supported by the private sector”. For its part, Saudi Arabia is setting up a \$40bn AI fund with American venture capitalists, and Google plans to establish an AI hub in the kingdom.

At the same time, China has emerged as the Gulf’s largest trading partner and is rapidly scaling up its investment in the region. When it comes to the Gulf states’ ambitious national blueprints to overhaul their economies by the end of the decade, the sheikhs have turned east, building tighter commercial and financial linkages with Chinese businesses and investors. Chinese companies are building infrastructure in Gulf states and bringing in industrial technology.

The Gulf’s cash-rich companies are reciprocating, pouring billions of petrodollars into technology firms and energy projects in China and elsewhere in Asia. In the process, the Gulf’s companies

▶ are opening up new markets and finding growth opportunities.

The problem is that America is hostile towards Chinese technology tie-ups. It made G42 sever its ties with Huawei, China's telecoms-equipment giant, before sealing the deal with Microsoft. America has been reluctant to allow exports of Nvidia's powerful AI chips to the Middle East, fearing that some of them will end up being sent to China. In February 2024 Du, an Emirati telecoms operator, signed an agreement with Huawei to build 5G networks. America has threatened to stop sharing intelligence with allies that deploy Huawei equipment, fearing that it will be used for spying.

But Gulf states see China as a reliable and attractive partner for achieving their current goals. China helped the UAE

become a global trading hub, setting up vast warehouses, wholesale operations and other useful infrastructure. It is also backing the shift to renewable energy by supplying solar panels and wind turbines. Chinese firms have been central to construction, transport and other industrial activity across the Gulf. Research-focused Chinese universities are fostering collaboration in science and technology with their peers in the Gulf, too.

Working with America, though, helps secure the Gulf's technological ambitions, which are central to its plans for economic diversification and future growth. Beyond AI, the Gulf's rulers are eyeing space, defence and cyber-security as promising areas in an increasingly tense region. But America has at times proved to be a transactional partner, stifling the ambitions of

Gulf states and their companies, and treating the region as a tool in its efforts to build influence in the global south. That will continue under Donald Trump.

Gulf states can look to other Asian countries as alternatives to China. Saudi Arabia has hedged its bets, collaborating with Indian and South Korean construction companies on some projects. But they struggle to compete with the speed, efficiency and manufacturing might of China's construction and engineering firms. China's companies are eager, too; a slowing economy at home is encouraging them to push into fast-growing foreign markets. In 2025 Gulf states will find that if they want deeper co-operation with Western firms on technology, they will have to be more circumspect about how they co-operate with China. ●

The young and the restless

Will there be enough jobs for Arab countries' growing youth populations?

Ann Hanna Newsdesk editor, *The Economist*

EGYPT'S STRONGMAN, Abdel-Fattah el-Sisi, said in 2021 that Egyptians should have "less than one" child per family. He has long been concerned about population growth, a topic that will become ever more pressing from 2025. His country—and several others in the region—are about to enter a second youth bulge. In Egypt the proportion of the population aged 15-24 peaked at just above 20% in 2010, before falling to around 17% in 2020. But the figure is starting to rise again, and will approach 20% by the middle of the 2030s, according to the UN.

The Egyptian economy is struggling, and Mr Sisi's worry is that there will not be enough jobs. It is not the only country in the region in this predicament: Jordan and Algeria are also experiencing bulges in their youth populations.

When looking at their labour markets, some countries have been lulled into a comparative sense of security in recent years. Egypt's unemployment rate has steadily fallen in the past decade to 6.5%, from a peak of 14.4% in 2013. But this was in large part because fewer people joined the workforce; the employment rate has also declined. The youth-unemployment rate in

the Middle East and north Africa, at 24.4%, is almost double the global average, according to the International Labour Organisation (ILO). In the next five years, supply of labour will far outstrip demand. Moreover, the new cohorts will be more educated: the jobs they want may not exist in markets dominated by services, tourism and manufacturing. The results could be growing unrest and surges in emigration.

But there are some possible solutions. Governments could pump more money into a number of potentially job-creating industries. A joint project by the ILO and the European Union identified the agricultural and textile sectors as promising opportunities in Egypt and Tunisia. The prospects are also bright in green energy. The World Bank reckons that if Egypt meets its green-energy targets, it could create 67,000 additional jobs a year until 2050.

Aware of the looming crisis, several governments are adjusting employment policies. Algeria, Tunisia and Morocco are making progress, but there is more to be done. Social-security schemes are lacking in most of the region—a major reason that many workers choose to work informally.

And any strides forward could be upended by crisis and displacement. Jordanians worry that an influx of Palestinians could cause problems for their sputtering economy. Displacement of Lebanese into Syria could be damaging to both economies. The last time there was a youth bulge, the region's young people took to the streets and launched the Arab spring, toppling several governments. This time around, authorities are already contending with the impact of a spreading regional war. A growing cohort of angry, disenfranchised youth would make things considerably worse. ●





Sudan sinks into hell

NAIROBI

The world's biggest humanitarian disaster will continue to be ignored

Tom Gardner Africa correspondent, *The Economist*

NO CITY IN Sudan besides the capital, Khartoum, is more fiercely fought over than el-Fasher, in the western region of Darfur. For much of 2024 it was under siege by the Rapid Support Forces (RSF), a paramilitary group that has spent more than 18 months trying to vanquish the regular Sudanese army, the Sudanese Armed Forces (SAF), and seize control of the state. As a result, el-Fasher is where the famine that now threatens to consume the whole country began. And because of the intensity of the fighting there, it is also a useful place to look to understand where the conflict, which may be the biggest and most devastating anywhere in the world today, might be heading next.

As this article was published, el-Fasher remained the SAF's last urban stronghold in Darfur. All its other garrisons in the region had been captured by the RSF many months earlier. Observers had long expected the city's fall, followed by ethnic cleansing of local black

African ethnic groups by the mostly Arab RSF. Hundreds of thousands of civilians have already fled, joining the more than 20% of the country's pre-war population of 50m who have been forced to flee their homes since the war began in April 2023.

But despite the RSF's superior weaponry and numbers, the SAF has clung on in el-Fasher, and elsewhere too. The RSF's rapid eastward and southward advances in the first half of 2024 got bogged down by the summer rains. In the far south, it got tied up in a three-way struggle with the army and a local rebel movement. And in Khartoum and its surroundings, the SAF gradually began to win back territory it had lost in the early months of the war. At the start of 2024, Muhammad Hamdan Dagalo, the RSF's notorious commander (better known as Hemedti), made a triumphant tour of the region's capitals, spurring talk of a total RSF victory. That now seems much less likely.

Instead, Sudan's civil war will probably grow even more brutal, complex and difficult to resolve. As in el-Fasher, where various local Darfuri armed groups have been fighting alongside the SAF, self-defence groups and militias will proliferate elsewhere. These include jihadist brigades linked to the army, as well units composed of former members of Sudan's feared national intelligence services. In areas liberated from the RSF in the second half of 2024, these forces were reportedly responsible for brutal repression and reprisal attacks. In some places, such violence will fuel localised ethnic conflict, pulling at Sudan's already badly frayed social fabric.

And in areas under RSF control, there will be resistance. Mr Dagalo's paramilitary forces, known for terrorising civilians from armoured jeeps and motorbikes, are adept at mobile warfare. But they are widely loathed throughout Sudan, where they have no record of governing—and have routinely committed atrocities. Even if they conquer more territory, their rule will be precarious.

Talks to broker a ceasefire have made scant progress, and that seems unlikely to change in 2025. The SAF considers itself the legitimate government of Sudan and is reluctant to sit down with what it sees as a jumped-up militia. During 2024 the army won the support of Russia and received arms from Iran, strengthening the hand of those in its senior ranks who oppose a ceasefire. Those include Islamist hardliners from the party of Sudan's former dictator, Omar al-Bashir, who see war as an opportunity to return to power, as well as business elites who see it as an opportunity to get rich.

For its part, the RSF also sees little reason to make concessions. It has the backing of the United Arab Emirates (UAE), which has continued to supply it with arms, including drones, despite widespread opprobrium. The UAE does so because it reckons, rightly, that it can get away with it.

Despite its horrifying human toll, and a high probability that the instability will soon spread beyond its borders, Sudan's civil war receives only a fraction of the international attention given to wars in the Middle East and Ukraine. Aid deliveries to mitigate what some experts predict will be the worst famine since China's Great Leap Forward are woefully inadequate. Over the next two years more than 10m people could perish—and far too little will be done to prevent it. ●

Sudan's civil war will grow even more brutal

Together is another country

CAPE TOWN

South Africa's coalition government needs to deliver in 2025

John McDermott Chief Africa correspondent, *The Economist*

THREE DECADES after the end of white-minority rule, South Africa is in the midst of a new era. In May 2024 the African National Congress lost the parliamentary majority it had held since the election of Nelson Mandela in 1994, as voters punished it for corruption, rising crime and high unemployment. That meant it needed a coalition to stay in power.

The Government of National Unity (GNU), anchored by the ANC and the former opposition, the liberal Democratic Alliance (DA), has undeniably improved the mood. Business sentiment, the stock-market and the rand have all risen. In one poll in September, 58% of South Africans said the GNU was doing well, while just 21% said it was not. In another, the share saying that the country was on the right track had doubled since April.

There are good reasons for optimism. The DA is a check on the ANC's daftest ideas. Its six cabinet ministers are pushing growth-friendly policies, such as making it easier for firms to hire skilled foreigners. These efforts dovetail with Operation

Vulindlela, a structural-reform initiative backed by Cyril Ramaphosa, the president. The power cuts that crippled the country have abated. Inflation is cooling and the central bank has cut interest rates.

Politically, the GNU is more stable than headlines about bickering politicians suggest. The ANC and the DA come from different political cultures. But their leaders have incentives to rub along. After a woeful start, Mr Ramaphosa's legacy depends on a better second full term. The DA wants to show it can be as effective in national government as it has been locally.

But there are huge challenges. In 2025 the GNU will need to deliver more than the odd reform if it is to spark the sustained economic growth required to erode one of the world's highest unemployment rates. An overhaul of freight rail and ports is urgently needed to unclog trade. The state needs to get a grip on corruption and crime. Policies are needed to make it easier for jobseekers to find work and for firms to hire staff. All the while the GNU must try to reverse the rise in public debt, which has tripled as a share of GDP since 2008.

But although Mr Ramaphosa thinks that the best way for the ANC to regain its majority is to govern well in the GNU, some powerful figures in his party disagree. They would rather partner with populist offshoots of the party, such as the Economic Freedom Fighters or Umkhonto we Sizwe. Working with these outfits would also make looting the state easier.

Therein lies the rub. The GNU can be unwieldy. But the coalition is the least bad way for South Africa to bolster its democracy and boost its economy. In a year in which South Africa will host the G20 summit, there is no better time for the country to once again inspire the world. ●

Men with guns

Don't expect them to give them up power

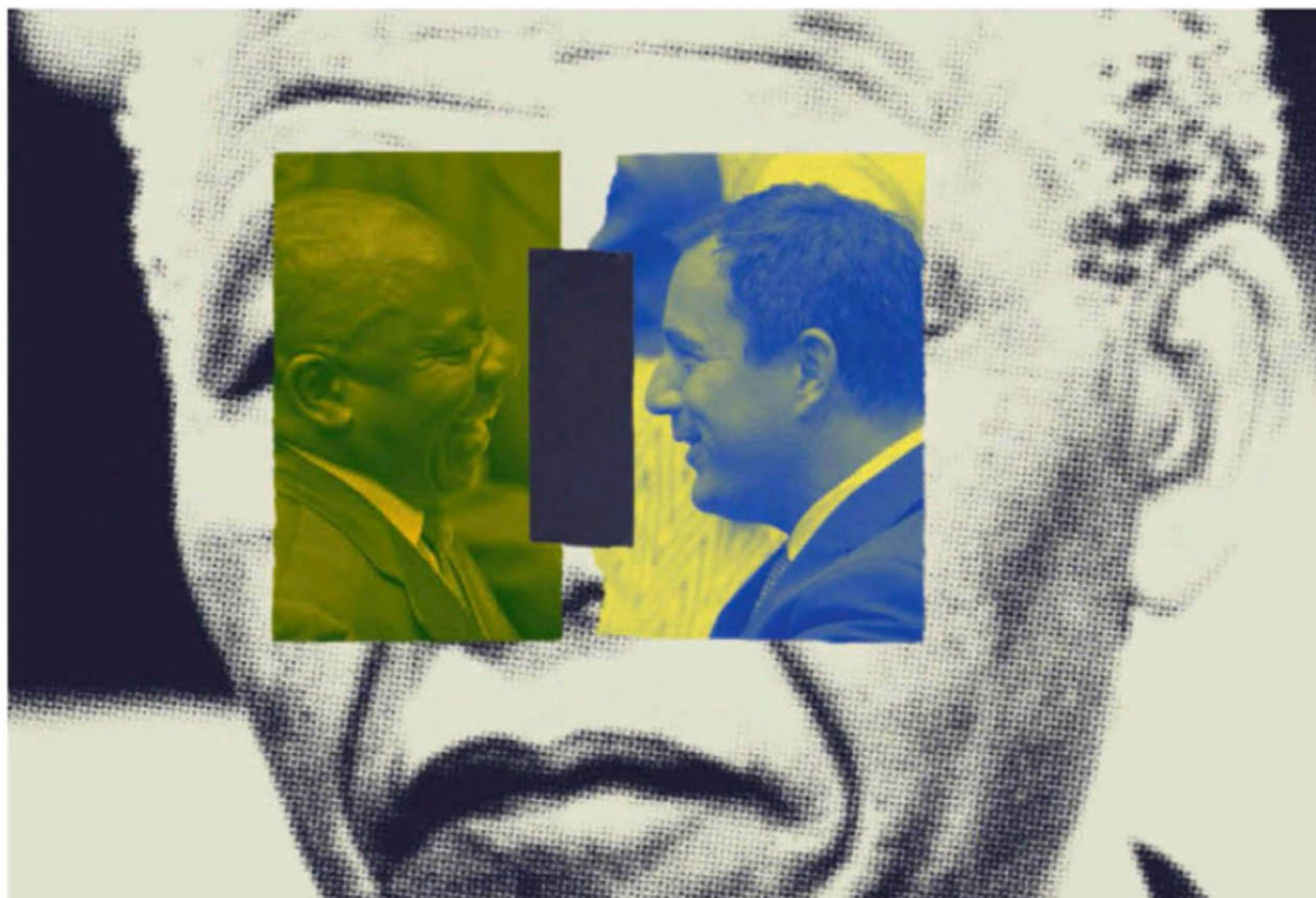
Tom Gardner Africa correspondent, *The Economist*

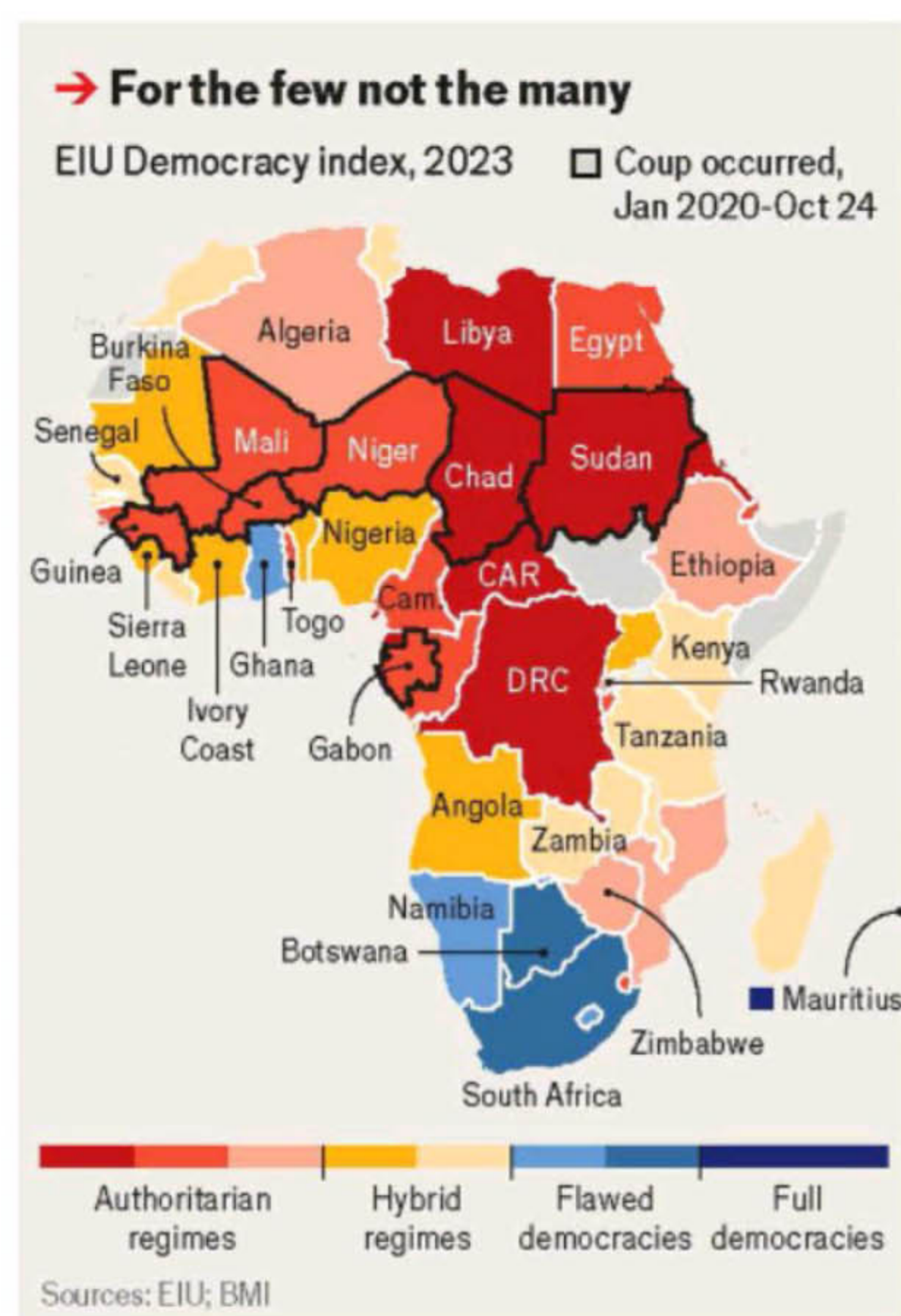
THE COVID pandemic accelerated a general turn away from free and fair elections in Africa. Several governments—most notably Ethiopia's—took the virus as an excuse to delay, or otherwise tamper with, the electoral process. Most alarming, however, was the flurry of coups, starting with Mali in 2020, followed swiftly by Guinea, Sudan, Burkina Faso, Niger, Gabon and arguably Chad. By the end of 2023, a uninterrupted "coup belt" stretched from the Atlantic to the Red Sea.

Optimists might think that 2024 was the year the dominoes stopped falling. Countries most at risk remained in civilian hands. Fears that Senegal, one of Africa's apparently most stable democracies, might succumb to military rule were also proved wrong. An attempt by the then president, Macky Sall, to delay elections was slapped down by the constitutional court. Bassirou Diomaye Faye, an anti-corruption crusader, swept to victory in the presidential election in March, becoming Africa's youngest democratically elected leader. And the defeat of the ruling party in Botswana's election, in October, was followed by a peaceful transfer of power.

Whether the past 12 months represent a lull, rather than a pivot, will become clearer in 2025. Several coup leaders who promised a "transition" are due either to hand over to civilians or prepare to do so. In Guinea, for example, Lieutenant Colonel Mamady Doumbouya, its ruler since a coup in 2021, has promised to leave office. The signs are not promising. The transition was originally supposed to end in 2024. But a referendum on a new constitution, which could allow Colonel Doumbouya to stand in elections, has yet to take place.

Gabon, the site of Africa's most recent coup, is in a similar predicament. Like Guinea's military rulers, who ousted an ageing president clinging to power, the army officers who toppled Gabon's president, Ali Bongo, in August 2023 were at first welcomed by the public. But unlike Colonel Doumbouya in Guinea, Gabon's "transitional president", Brice Clotaire Oligui Nguema, is reckoned to be still





A greener continent?

LAGOS

Investments in Africa are becoming more eco-friendly

Ore Ogunbiyi Africa correspondent, *The Economist*

AFRICA IS ESPECIALLY exposed to extreme weather events. Droughts, desertification and flooding are constantly upending lives and businesses on the continent, where half a billion people lack access to electricity. In response, some financiers have decided that putting climate and clean energy at the forefront of their investments not only unlocks new funding but also mitigates climate risk, making their projects more viable.

Startups have been leading the way for some time: almost half of all venture-capital activity in Africa in the first half of 2024 went to green projects. Solar-powered innovations are popular as panels continue to get cheaper. Beyond solar, geothermal energy has become a mainstay in Kenya, and is growing in Ethiopia, too.

This “greening” is not just happening in the energy sector. Food-production and insurance companies are becoming more climate-friendly. Other industries, notably fintech and telecoms, have provided foundations on which companies can offer green products and services, even to

poorer customers, while remaining profitable. The rapidly growing carbon market is also attracting fresh capital. Blue Carbon, an offsetting firm based in the United Arab Emirates, has bought up millions of acres of forest land, from Liberia to Kenya.

Although foreign direct investment in Africa is slowing, a growing chunk of funding from rich countries is being ring-fenced for green megaprojects, as Western countries become increasingly reluctant to support new fossil-fuel developments. The German government’s promise to invest €4bn (\$4.3bn) in African green-energy projects by 2030 includes backing for a green-hydrogen plant in Mauritania, for example. Part of China’s \$51bn investment in Africa will go to 30 clean-energy projects. Britain has invested in a \$200m African fund which will provide equity to climate-focused companies. The fund aims to double that amount in 2025.

But closing Africa’s biggest infrastructure gaps, for energy provision and broader industrialisation, will require a lot more than what is currently on offer. “Industrialisation is not going to take place on solar panels,” says Philippe Valahu of Private Infrastructure Development Group. A group of 18 African states, partnering with the African Export-Import Bank, is seeking \$5bn for an “energy bank” to fund fossil-fuel projects of the kind that Western investors are shunning.

Ultimately, Africa’s combined climate and energy challenges have become too big to ignore. And more investment in these areas will benefit other industries. A robust grid with a diverse energy mix will reduce the cost of running everything from factories to data centres, in turn creating new opportunities. ●

▶ quite popular. How long that will last is an open question. Mr Oligui Nguema seems in no hurry to usher in democracy. And if elections are held, as they are supposed to be, in August 2025, he will probably stand and will almost certainly win.

In the Sahel, the region most affected by jihadist violence and military rule, democracy’s prospects are even dimmer. In theory, Niger’s democratic transition is supposed to last no more than three years. But since July 2024 it has been part of the Alliance of Sahel States (AES), a proposed confederation with Mali and Burkina Faso. The AES, which began as a defence pact, is no champion of democracy. Both Mali and Burkina Faso were meant to hold elections during 2024. Neither did. Niger’s junta is unlikely to behave any differently.

But don’t expect Niger’s neighbours to make much of a fuss. The Economic Community of West African States (ECOWAS), the regional bloc, once considered sending troops to remove the junta. Yet in 2024 the bloc quietly lifted the economic sanctions it had imposed after the coup a year earlier. Mr Faye of Senegal, which is leading mediation efforts with the AES, is sympathetic to some of the club’s anti-Western agenda and would like its members to return to the ECOWAS fold.

The West is unlikely to exert much pressure on juntas to hand over to civilians. Guinea is home to the world’s largest untapped iron and bauxite reserves. Gabon hosts a French military base. France and America have both been forced to withdraw troops from Niger, where they had been battling jihadists. For would-be putschists, this will be cheering. The clear lesson is that it is possible to seize power by force and get away with it. ●



↑ *Enough sun to go round*

A tale of two Africas

LUANDA

Not everyone is having a lost decade

John McDermott Chief Africa correspondent,
The Economist

TO WALK AROUND Luanda, Angola's capital, is to tour a graveyard of another era. Half-finished or empty skyscrapers loom over the sun-kissed corniche. Some of the bars along the beach are gaudy monuments to when the price of oil was consistently above \$100 and the elites partied in sub-Saharan Africa's second-largest producer country. You can still see the odd bottle of Château Pétrus gathering dust on a supermarket shelf, a relic of a headier time.

A decade on from the end of the commodities boom that fuelled Africa's growth at the start of the 21st century, Angola's economy is still struggling. GDP per person is almost a third lower than it was in 2014. Debts from the good times are now due. Vera Daves de Sousa, the country's finance minister, says that despite her successful efforts to renegotiate terms with Chinese creditors and get a loan from the IMF, 58% of government revenue goes on servicing debts.

Angola's story has echoes in other African countries. In October the IMF described what it calls "sub-Saharan Africa's two-track growth pattern". On one track are the 23 countries it classifies as "resource-intensive", which it defines as having at least 25% of exports in non-renewable commodities such as oil, gold or diamonds. As well as Angola this list includes the two largest economies in sub-Saharan Africa: Nigeria (also the region's largest oil producer) and South Africa (where gold, platinum and coal alone comprise about a third of exports).

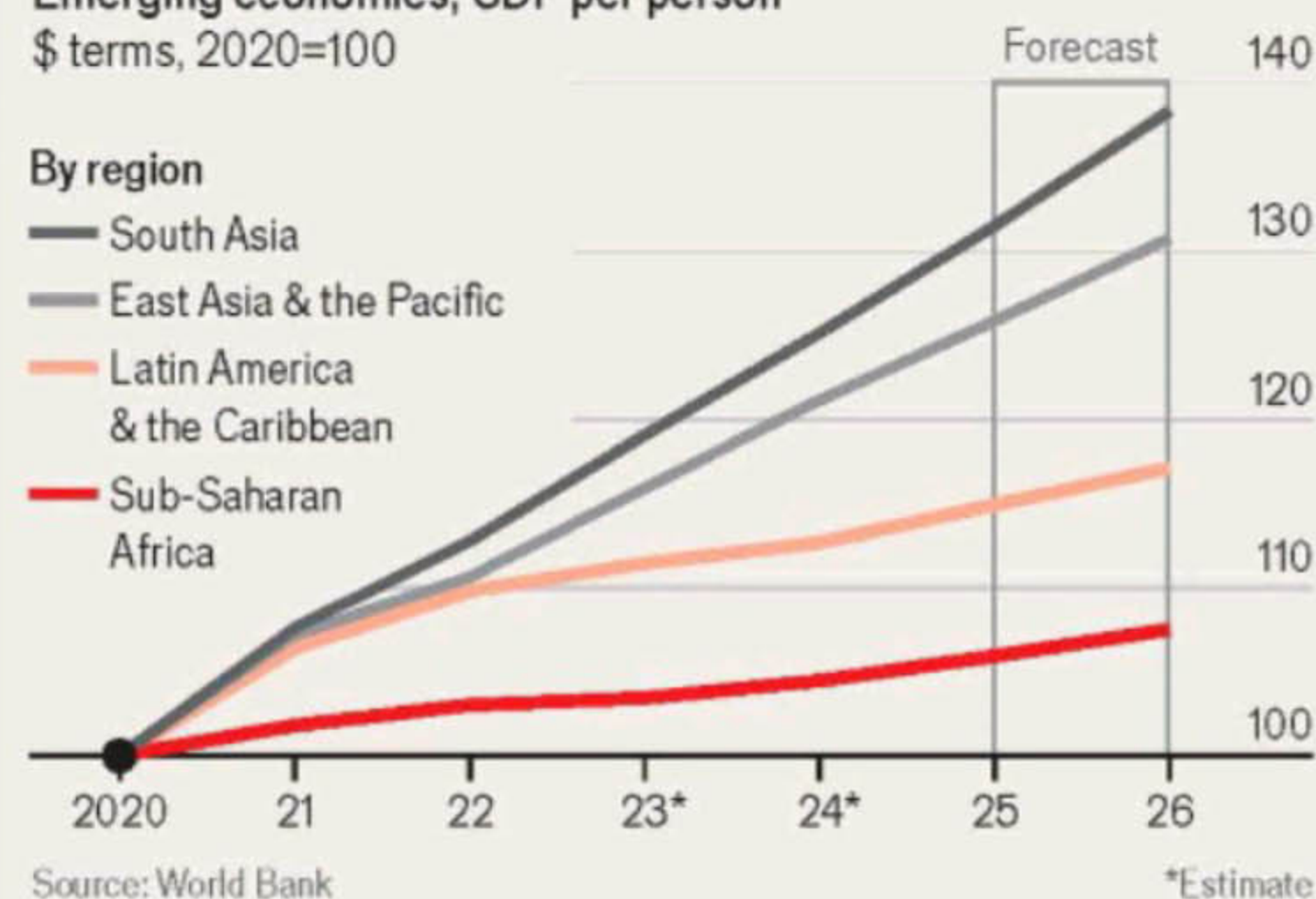
On average, resource-intensive countries have a lower GDP per person today than they did a decade ago. This is a direct result of lower prices for their exports. But it also reflects deeper problems. Most resource-rich countries have focused more on dividing the spoils of the boom years than on using the proceeds to build resilient economies.

On the other track are those countries less dependent on commodities. GDP per person there kept growing steadily after the boom ended and the divergence is set to continue. In 2025, the IMF says, nine of the world's 20 fastest-growing economies will be in Africa. Most of these are non-resource-intensive states. Rwanda, Ethiopia, Ivory Coast and Tanzania, for example, are projected to grow by at least 6%. For all the faults of their politicians, it probably helps that, in the absence of a golden (or oily) goose, they have had to learn to find other sources of growth.

This is good news for sub-Saharan Africa. The

→ Long way to go

Emerging economies, GDP per person
\$ terms, 2020=100



region faces profound challenges: tight budgets caused by low growth and high debts mean there is little room to invest in the future. Financing for schools, infrastructure and adapting to climate change is hard to raise at home or internationally. A lack of formal jobs for the millions of people entering the labour market every year worries policymakers. Many observers are sceptical that the region can ever catch up with the rest of the world. So if some African states can close the gap they can be exemplars.

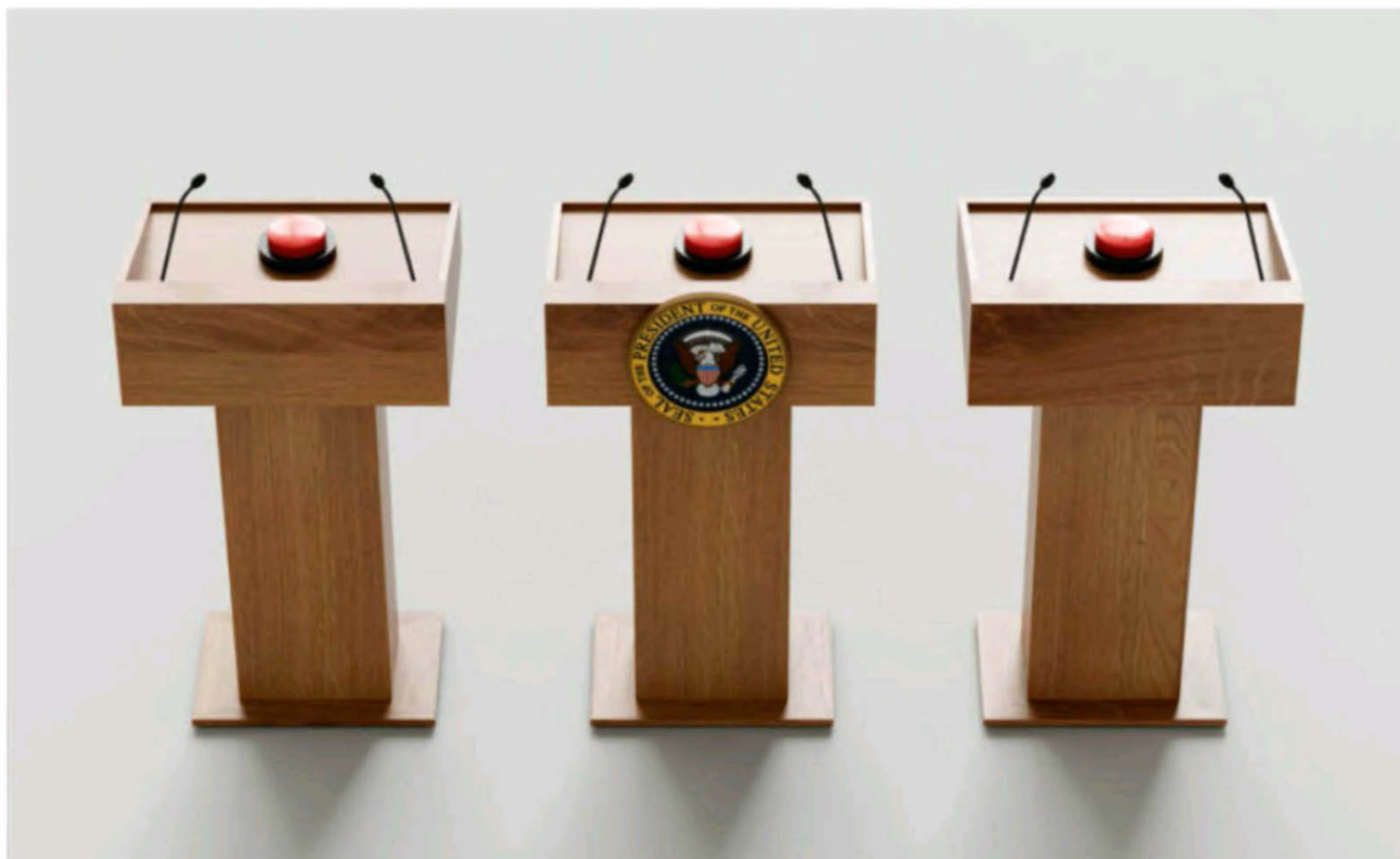
The bad news is that the economies of these outliers are not big enough to power the continent, at least not yet. South Africa, Nigeria and Angola alone make up almost 40% of sub-Saharan Africa's GDP. It is time that these giants got their act together—and started to learn from their nimbler peers. ●

In 2025, nine of the world's 20 fastest-growing economies will be in Africa



↑ Tanzania rising

International



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Farewell to arms control

Donald Trump must decide how to compete in the third nuclear age

Anton La Guardia Diplomatic editor,
The Economist

AS 2025 DAWNS, the world is moving further into what many are calling the third nuclear age. It will probably feature more nuclear weapons, more nuclear-armed states, no limits on their arsenals and few qualms about threatening to use them.

The first nuclear era was terrifying enough. America and the Soviet Union confronted each other with tens of thousands of warheads each. The second era, after the end of the cold war, was calmer. Nuclear stockpiles shrank dramatically—though India, Pakistan and North Korea went nuclear during this

period. The third age may resemble a new cold war, only more chaotic and with more potential foes.

Russia's all-out invasion of Ukraine in 2022, and Vladimir Putin's threats to use nuclear weapons, marked a milestone towards this new era. So did Xi Jinping's decision to expand China's nuclear arsenal, which the Pentagon has warned about since 2021.

Another big moment will probably come in 2025, when Donald Trump must decide how to respond. New START, the last arms-control treaty limiting nuclear armaments, expires in February 2026. Should America seek a follow-on deal with Russia? There is little prospect of a new arms-control agreement given that Russia has already suspended vital provisions to verify compliance with New START. As for China, it is bound by no such requirements, and has halted what little dialogue it had with America on the issue. For the first time in decades, then, nuclear stockpiles will probably no longer be subject to formal limits.

The old two-power deterrence game will turn into a more complex three-sided rivalry in which two countries—Russia and China—work ever more closely. It may be more bewildering still, given that North Korea, which has nuclear weapons, and Iran, which is on the threshold of being able to acquire them, are drawing closer to Russia and China. Other countries may seek their own nukes if America under Mr Trump is seen as an unreliable protector. Saudi Arabia says it will go nuclear if Iran does. South Korea has recently debated developing its own deterrent. Ukraine suggests it might do so if it cannot join NATO.

▶ America and Russia have more than 5,000 warheads each. Both say that they are abiding by New START's limits on "strategic", or long-distance, nuclear weapons. Each is allowed to deploy 1,550 strategic warheads and 700 launchers, such as intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs) and long-range bombers. The rest of the stockpile, including smaller "tactical" nukes and weapons in storage, is not restricted. The Pentagon projects that China's stockpile, currently about 500 warheads, will exceed 1,000 by 2030, and perhaps 1,500 by 2035. Britain, France, India, Pakistan, Israel and North Korea have much smaller arsenals.

Mr Trump, scornful of arms control and fond of his "nuclear button", may well seek a build-up. The first move would be to "upload" nuclear weapons—ie, shift warheads from reserves to deployed systems. This would involve modifying bombers, adding extra warheads to ICBMs and unsealing launch tubes on Ohio-class submarines. Officials are drawing up plans

**America's
defence
industry has
little spare
capacity**

to do so. Expect the new president to allow the Pentagon to hold exercises to show the ability to upload quickly, as recommended by a bipartisan commission report in 2023. Plans for a submarine-launched cruise missile carrying nuclear weapons—approved by Mr Trump, shelved by President Joe Biden and reinstated by Congress—will get a boost.

A bad idea doing the rounds in Mr Trump's entourage is to resume nuclear testing, which the big powers halted in the 1990s. Even hawkish American nuclear experts who favour a build-up think testing is pointless chest-thumping. But America will come up against hard problems if it seeks to expand its actual stockpile. Its defence industry has little spare capacity. Efforts to modernise land-, sea- and air-based weapons are suffering from delays and cost overruns. Most egregious is the Sentinel programme to replace Minuteman III ICBMs, which, at \$141bn, is 81% over budget. If the new president decides to join the new nuclear-arms race, it will take time to gather speed. ●

Strange bedfellows

*How the world lines up,
from wars to whales*

Anton La Guardia Diplomatic editor,
The Economist

THERE IS MUCH talk of a new cold war, but the world has not quite reverted to the old blocs of East, West and a fuzzy non-aligned, ex-colonial middle. Instead many countries triangulate between the big powers to gain advantage, sometimes creating odd bedfellows.

America has strengthened NATO, created new security partnerships in Asia, and brought its European and Asian allies closer together. Some want to expand the G7 group of industrialised countries to include more Indo-Pacific friends. But such alliance-building may unravel with the return of Donald Trump.

Russia and China have drawn closer to Iran and North Korea in a military "axis of autocracy". The pair are also building the BRICS group into a rival economic forum. It also includes India, Brazil, South Africa, the United Arab Emirates, Egypt, Iran and Ethiopia. Expect it to keep expanding as it seeks, for instance, alternatives to trading in American dollars. India, which has a "multi-aligned" policy, also participates in the Quad—a partnership with America, Japan and Australia.

At the UN, Russia can count on just a

handful of true supporters for its war in Ukraine, including Belarus, North Korea and Syria. Israel is protected by America's veto at the Security Council. It has only a few friends in the assembly, such as some Pacific-island states, Hungary and Canada.

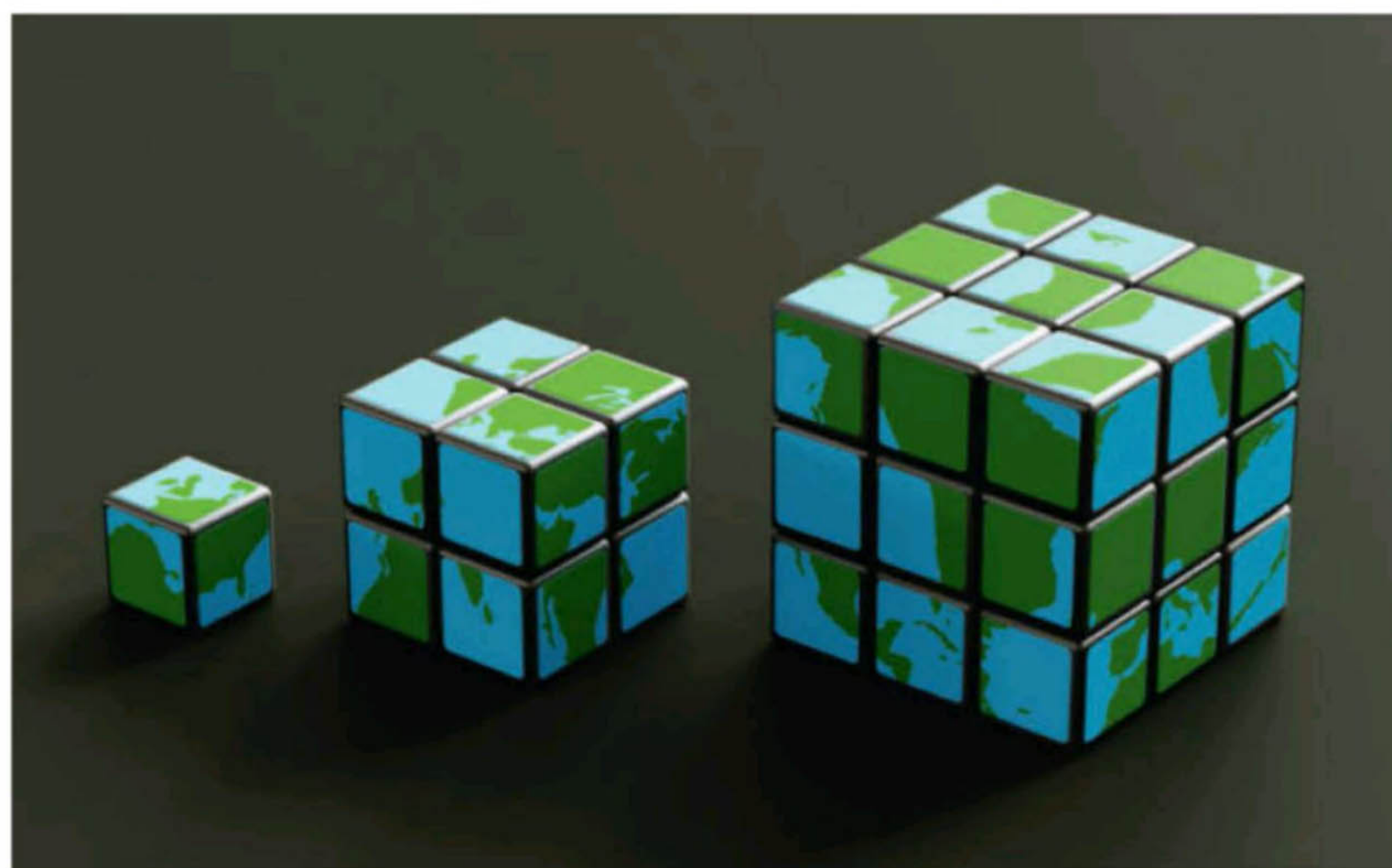
Then there is Taiwan, a democratic, self-governing island that was booted out of the UN in 1971 and faces the perennial threat of invasion by China. It is recognised by just 12 countries, including Tuvalu, Eswatini and Haiti. Expect China to keep picking off Taiwan's remaining friends.

Geopolitical tensions are playing oddly in the Sahel, where the three coup leaders from Mali, Burkina Faso and Niger broke away from ECOWAS, the main regional body, to form their own "confederation". They have kicked out French and other Western troops and have embraced Russia. For its part, Ukraine is not-so-secretly helping rebels take on these regimes and

their Wagner mercenary supporters.

The Trump administration will almost certainly withdraw from the Paris accords on climate change, UNESCO and the UN Human Rights Commission, as it did in its first term. It may also return to its strange alignment with Muslim and Catholic countries to weaken international commitments to women's rights, especially on abortion.

One of the oddest diplomatic battles will continue before the next meeting of the International Whaling Commission in 2026. The creation of a whale sanctuary in the South Atlantic failed by one vote in 2024. Japan left the commission in 2019 to resume commercial whaling. Two other whalers, Norway and Iceland, also exert influence. Pro-whaling states have found allies in Laos and Mongolia. They may have no coast to speak of, but value the favours and aid their votes can attract. ●



Have global emissions peaked?

*The world will find out in 2025.
It all depends on China*

Rachel Dobbs Environment editor, *The Economist*

HAVE GLOBAL emissions of greenhouse gases passed their peak? It is entirely possible. The world will find out, one way or another, in 2025. Passing the peak would be a significant moment in the fight against climate change. In its most recent assessment report, the Intergovernmental Panel on Climate Change, the UN body that monitors climate science, said 2025 was the year by which greenhouse-gas emissions must peak if the world is to have a good chance of keeping global temperature rises within the 1.5-2°C limits specified by the Paris climate agreement.

Why the uncertainty? It takes time to tot up the overall balance of emissions for each country, and to ensure that minor fluctuations are not mistaken for major trends. Under UN rules, rich countries must submit their emissions inventories each year. Poorer countries originally had to do so roughly every four years, but this was shortened to two years in 2024.

Having grown wealthy and powerful through industrialisation, the world's rich democracies have moved away from heavy industry and have decoupled economic growth from their emissions. Most have reported falling emissions for a least a decade, if not longer. Japan hit its peak in 2013, America in 2007, Germany in 1990 and Britain in 1973. Poorer countries' emissions, however, have continued to expand alongside their economies and left them wary of curtailing either. China will not promise anything before 2030; Brazil, India and Indonesia, among others, have yet to commit to a specific date.

→ When degrowth is good

China, CO₂ emissions*, change on a year earlier
Million tonnes



Source: CREA

*From fossil fuels and cement



↑ *Changing the global trajectory*

But the link between emissions and development has been steadily weakening as energy is used more efficiently and produced in greener ways. This is particularly true of China, which is both the largest greenhouse-gas emitter—producing 30% of the planet's total—and the main driving force behind the expansion of renewable energy (it is building twice as much new solar and wind capacity as the rest of the world combined). China has to report its emissions figures less frequently than Europe or America, and because of delays it has not submitted an update since December 2023, when it provided data only up to 2018.

Observers have, therefore, been frantically trying to divine the trajectory of China's emissions. They rose sharply in 2023 after draconian covid-19 restrictions were lifted. But they seem to have fallen since: analysis by the Asia Society Policy Institute, a think-tank, showed a 3% drop in the year to March 2024. Lauri Myllyvirta, one of the analysts behind the work, reckons China's emissions may have peaked in 2023.

None of this is certain. Mr Myllyvirta notes that higher-than-expected demand for fossil fuels from Chinese industry could upset the predicted trend. China's next official emissions report—due on the last day of 2024—will clarify matters, as will further updates in 2025. But China's emissions are so enormous that a peak would alter the global trajectory.

That would be a great achievement. But it means very little on its own. Any pathway to 1.5°C (and many that end up somewhere hotter) would still require further aggressive emissions cuts and carbon removal. Passing peak emissions should be celebrated. But once emissions are no longer going up, what really matters is how quickly they can be brought down. ●

Links between emissions and development have been weakening

Questions of seniority

World leaders are getting older, except in democracies

Ainslie Johnstone Data journalist, *The Economist*

THE ADVANCED age of many world leaders came into sharp focus in 2024, when 81-year-old Joe Biden was pressed into pulling out of America's presidential race over concerns about his mental acuity. Americans then elected Donald Trump who, at 78, is no spring chicken. In India, the world's largest democracy, Narendra Modi, now 74, began his third term as prime minister, and 72-year-old Prabowo Subianto shuffled into office in Indonesia. Going into 2025, the world's leaders are, on average, older than ever.

That is not necessarily a problem. Experience can bring wisdom. But slowing

down, physically and mentally, is inevitable with age. Research has found that older politicians are less concerned with the needs of the young, and spend less on child welfare and more on benefits for seniors. Over the past five decades the average age of all leaders has risen from 55 to 62. But there are different trends in different types of countries.

The more free and fair a country's elections are, the less its leaders have aged. In countries that are classified as democracies by the Economist Intelligence Unit (our sister organisation), current heads of government tend to be slightly younger than their predecessors, with an average age of 59. In 1975 there were no democratic leaders under 45, but now there are three. There are more mature leaders, too. In 1975 no free country had a leader over 75. Now five do.

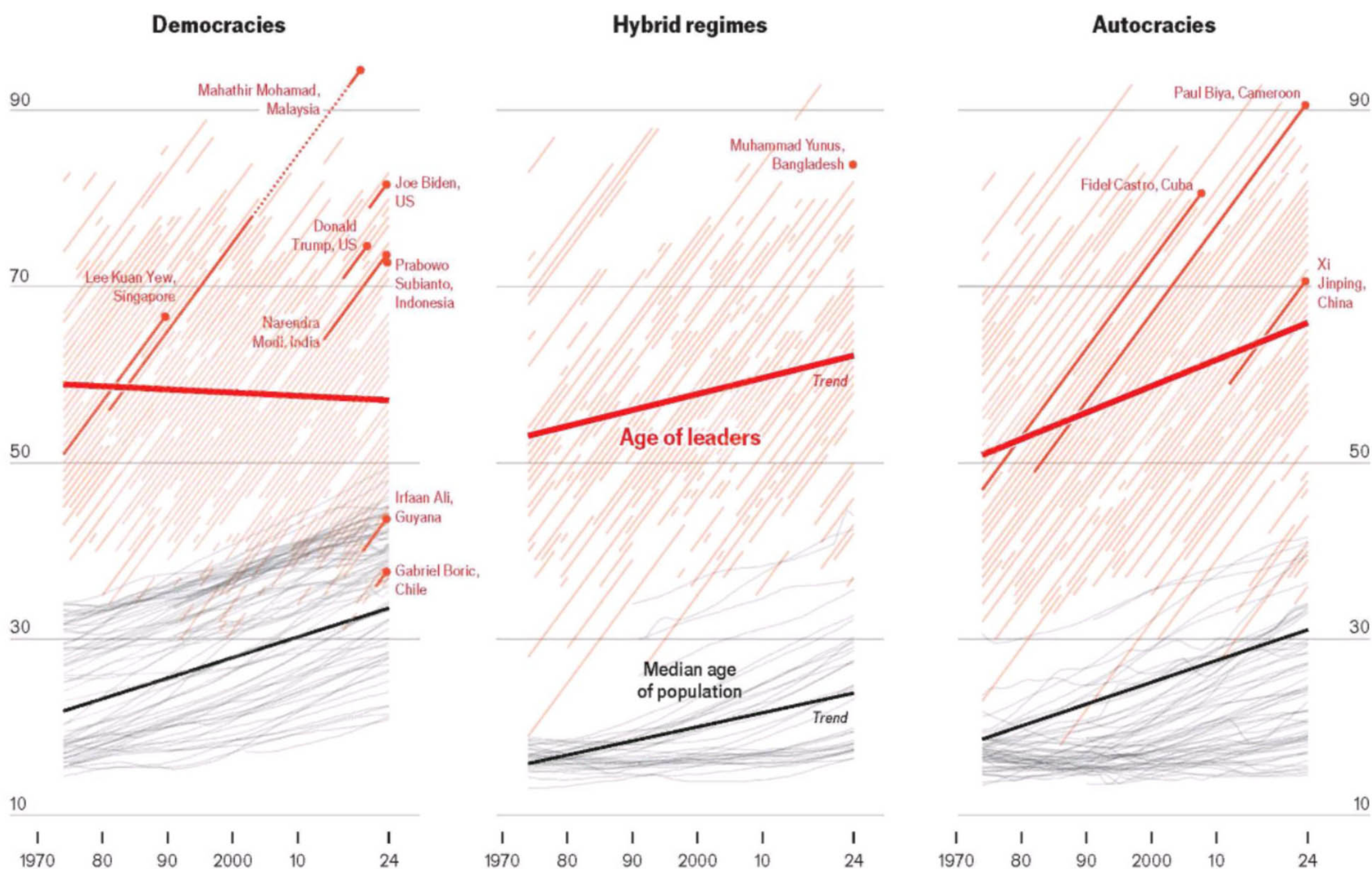
Among democracies, America is an outlier. In the past 50 years its politicians, and not just presidents, have got much older. Its legislators are the oldest in the rich world. In the 118th Congress the average age of members of the House of Representatives and the Senate is 59, almost a decade older than the average for elected lawmakers in the OECD, a club of mostly rich countries. The same generation has dominated American

politics for 30 years, in part because of big advantages for incumbents. There seems little prospect of this changing.

Countries that have less of a say in their government are driving the trend towards ageing leaders. In hybrid regimes allowing some political rights, heads of government are now 62 years old on average, nine years older than their predecessors five decades ago. In authoritarian regimes the change is even more dramatic. The average dictator is now 64, 12 years older than in 1975. A total of 11 autocracies have leaders over 75.

In countries that do not choose their leaders, those in power have always been reluctant to give it up. What has changed over the past 50 years is that many of these leaders, along with the people they rule, are living far longer. Until more countries adopt democracy, or increases in life expectancy slow down, leaders will become ever longer in the tooth.

The increase in life expectancy around the world, together with the stalling of birth rates, also means that leaders, on average, have become more like the populations they govern. In 1975 the average age gap between leaders and their subjects was 42 years; now it is 39. In the years ahead, expect world leaders to become increasingly grey. But the rest of the world will be greying with them. ●



All shook up

Prepare for a worldwide wrangle over copyright, deepfakes and more

Tom Wainwright Technology and media editor,
The Economist

WORDS, PICTURES, music and now video: generative artificial intelligence (AI) seems like a near-magical tool for creating new and original content in unlimited quantities. Yet to its detractors it is a scam, chewing up human-made, copyrighted work and spewing out pale, derivative imitations. Who is right? In 2025 a combination of litigation and legislation will begin to provide some answers.

Start with the litigation. Representatives of nearly every creative industry have filed copyright-infringement complaints against generative-AI companies for using their material, without payment or permission, to train their AI models. Most of the legal action is in America, where OpenAI and Microsoft are being sued by the *New York Times*, and Anthropic is being pursued by parties including Universal Music Group. In Britain, Stability AI is being sued by Getty Images. All deny wrongdoing.

These and other disputes may be settled out of court: some see the lawsuits as a negotiating tactic by content companies to make tech firms cough up. OpenAI has made at least 29 licensing deals with platforms and publishers, from Reddit to the *Financial Times*, according to a tally by Peter Brown of the Tow Centre for Digital Journalism at Columbia University. (The Economist Group, our parent company, has not taken a public position.) The value of OpenAI's deals alone already exceeds \$350m, by Mr Brown's reckoning. A rocky time in court in the coming months could cause that figure to rise.

If claimants resist settling, legal precedents will be set in 2025 that could shape the tech industry for years to come. In America the tech companies are narrow favourites to win. Their "fair use" defence (essentially, that copyrighted material can be used without explicit permission in some cases) has got them off the hook in previous copyright cases, such as a legal complaint against Google Books nearly a decade ago.

However, "if they get to a jury, anything is possible", cautions Matthew Sag of Emory University's School of Law. Stability AI faces a harder test: Britain's copyright law is somewhat stricter than America's, and Getty is also claiming trademark infringement, after some of Stability's generated images reproduced its logo.

As courts deliberate over existing laws, legislatures will debate new ones, in particular on "deepfakes", which use AI to insert a person's likeness into an existing photo or video, often of a pornographic

nature. This is worrying parents (whose children are being harassed with "nudifying" apps), celebrities (whose likenesses are being stolen by con artists) and politicians (who have found themselves the targets of AI-powered disinformation). In March the American state of Tennessee passed the Ensuring Likeness Voice and Image Security (ELVIS) Act, to protect performers from having their image or voice used illegally. California has passed laws to stop political deepfakes.

Copyright law may also be reformed. The European Union, Japan, Israel and Singapore have already introduced exceptions to allow the use of copyrighted material, without permission or payment, in the training of AI models, at least under some circumstances. Some in Silicon Valley worry that tech investment could flow away from America to more relaxed jurisdictions. Yet, so far, no country seems willing to become a regulatory wild west. Japan seems minded to tighten the exceptions it has set, to protect copyright interests. Most countries are coalescing around a moderate position: a "race to the middle" is most likely, believes Mr Sag.

The emerging compromise is that tech companies will have to find ways to allow copyright-holders to opt out of having their content used for training. Tech firms will also have to make AI tools better at handling abstract concepts without regurgitating copyrighted material (for instance, being able to draw a generic superhero without reproducing images of Superman). That may prove easier said than done. Do not be surprised if the year ahead is one in which AI generates more questions than regulators can answer. ●

Tennessee passed the ELVIS Act to protect artists



Wish you weren't here

The shock of "overtourism" will subside in 2025

Leo Mirani Asia correspondent, *The Economist*

IS THERE SUCH a thing as "overtourism"? Ask people lucky enough to live in or near Amsterdam, Goa, Mount Fuji or any decent-size city in southern Europe, and they will answer with a resounding "Yes". They are, you might say, over tourism. The influx of tourists, they grumble, is causing congestion and pollution, driving up housing costs and skewing development priorities away from the needs of locals. Many are calling for authorities to do something about it.

Some things have been done. In 2024 Venice limited tour groups to 25 people and, on peak days, instituted a €5 (\$5.30) fee for day-trippers. Amsterdam is planning to move its cruise-ship terminal away from the city centre, and forcing some ships to dock 85km away in Rotterdam. Barcelona and some parts of Greece are cracking down on cruise ships and short-term rentals, like those offered by Airbnb. Rome is mulling a €2 fee to see the Trevi fountain. New Zealand, a country with eight times as many sheep as tourists, has tripled its levy on visitors.

The impact of these moves is unclear. Nearly half a million people happily paid Venice's fee, about the cost of a coffee in Piazza San Marco, which suggests that it was too small to deter day-trippers. Large tour groups split up into parties of 25, but stuck close together. Moving cruise terminals out of city centres may increase road traffic as tourists travel to and from ports. And abolishing Airbnb-type rentals reduces competition and lets incumbent hotel operators charge more. Such moves are not only cosmetic, they are an overreaction to overtourism.

The summer of 2024 was a record-breaking one for travel as post-pandemic tourism continued to boom. Arrivals for the whole year are expected to slightly exceed the 2019 peak. Yet that boom is misleading. Globally, between 1995 and 2019, international tourist arrivals grew at an average annual rate of about 5%, before collapsing with the lockdowns of 2020 and 2021. For arrivals to return to 2019 levels meant growth rates of 66% in 2022, 46% in 2023 and at least 38% in 2024. A growth rate

of 5% can seem manageable; a growth rate of 40% can feel like an unstoppable deluge. Confronted by 25 years' worth of growth in three, even the most hospitable people will reach their limits.

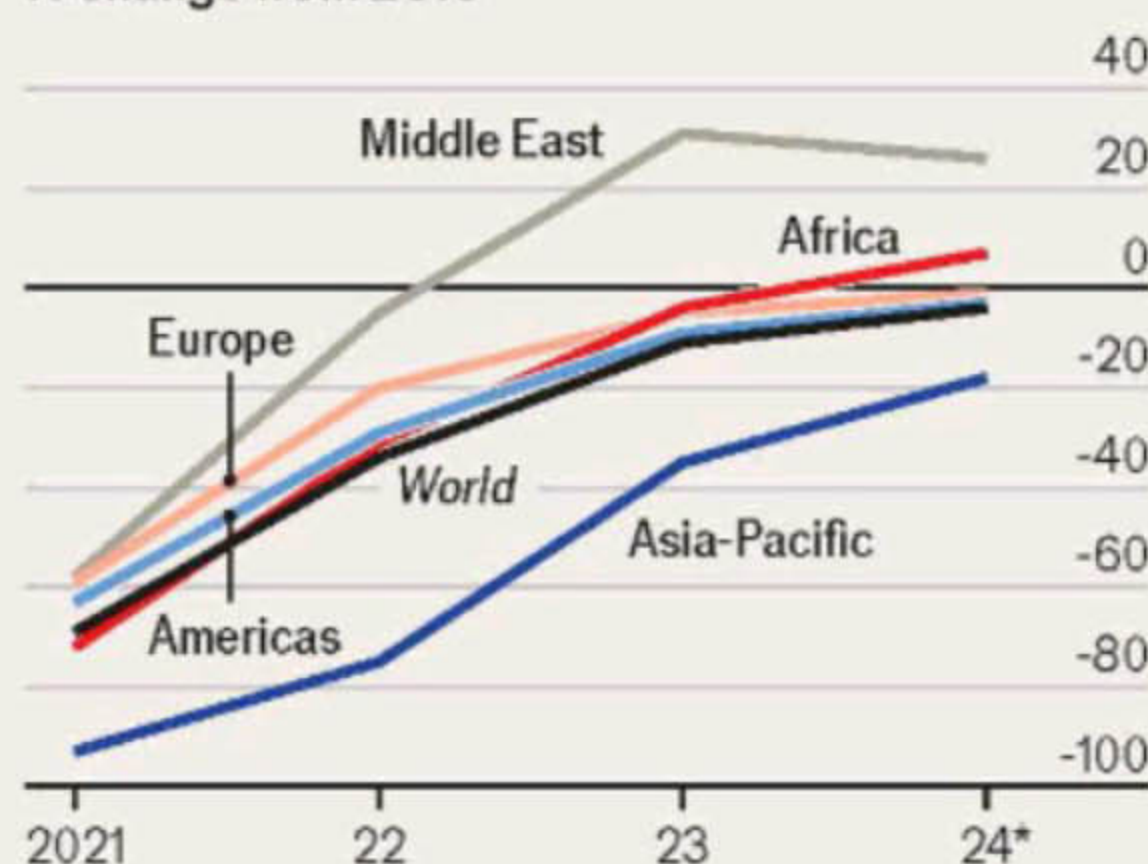
The good news is that 2025 is likely to feel quieter. Airlines, hotels and cruise lines are seeing traffic to their websites dip. Airbnb warned in August that foreign demand from Americans—a huge tourist market—was slowing. Online travel agents say prices are moderating. Hotels and other travel-and-tourism companies are issuing similar warnings. The signs are that things, especially in Europe, may be returning to normal. Tourist numbers will still climb, but growth will return to its more sedate, pre-pandemic pace.

To take advantage of the economic opportunities tourism offers, cities blessed with visitors might want to avoid putting up barriers, and instead enhance their readiness to welcome travellers. This includes measures like encouraging off-season travel and managing how tourists are distributed across a city or island so "they're not all in the same square kilometre", says Margaux Constantin of McKinsey, a consultancy. In 2023 London received 18.8m visitors, more than any city except Istanbul. Yet few Londoners complain about tourists (though they do complain about many other things).

The alternative is to pull up the drawbridge and lose business to other destinations. But tourism is a lucrative export industry; many countries that envy Europe's problems are easing visa restrictions to lure travellers from places such as India, where outward tourism is booming. And noisy protesters in European cities are only a small minority. Asked in a recent survey about the impact tourists had on their cities, 75% of Spaniards said it was positive. Just 8% felt the opposite. The same people who complain about overtourism in their neighbourhoods are, after all, sometimes tourists in other people's cities, too. ●

→ Back on the road

International tourist arrivals, % change from 2019



Source: World Tourism Organisation

*January-July

Crowded skies

The skies above are getting smaller—and more dangerous

Leo Mirani Asia correspondent, *The Economist*

CONSIDER THIS scenario: war in the Middle East shuts down airspace over Iran, Iraq, Israel, Jordan and Lebanon. To the north, Russian skies remain forbidden to Western airlines. Given that most airlines have long avoided routes that cross Syria, Ukraine and Yemen, and many also avoid Afghanistan, the effect on aviation would be enormous. The world's busiest routes would be squeezed into a few heavily congested corridors. There would not be room in the skies for all east-west air traffic, says Thomas Jaeger, the founder of ch-aviation, a data company.

Something almost exactly like this occurred in August 2024, as the world waited anxiously for Iran's response to Israel's assassination of a senior Hamas official in Tehran. In the event, the disruption was brief. But as the world enters an era of growing conflict and geopolitical rivalry, international civil aviation faces ever more constraints. In October 2024, as tensions rose in the Middle East after Israel's assassination of Hizbullah leaders, the International Air Transport Association, a trade body, issued a reminder that "civil aviation serves the civilian population" and "must be kept out of harm's way by all actors in a conflict".

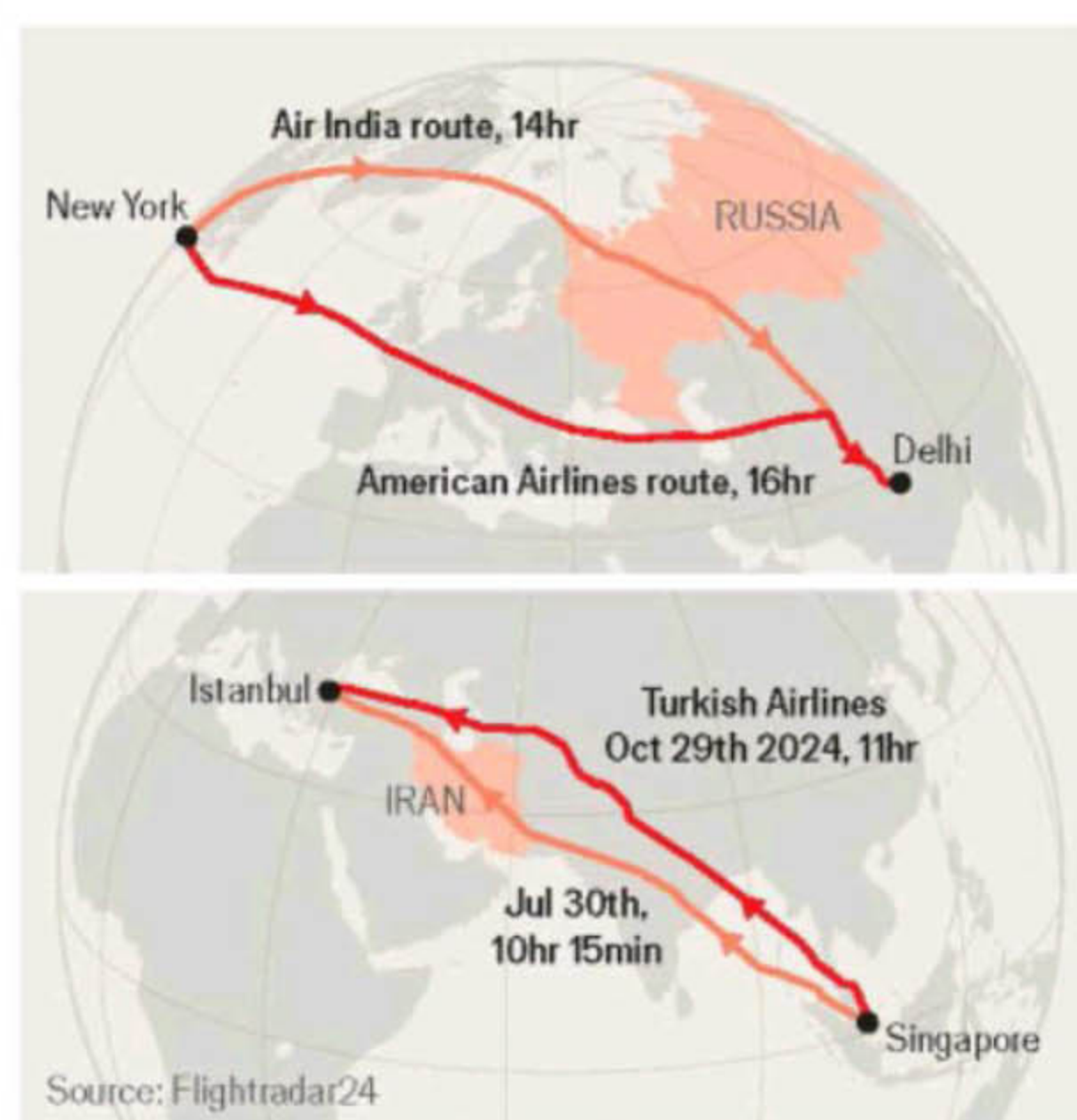
The skies have been getting smaller since 2014, when Russian operatives shot down a Malaysian airliner flying over Ukraine. In 2020 Iranian forces shot down a Ukrainian passenger jet near Tehran, killing 176, in the mistaken belief that it was a "hostile target". Partly as a result of these catastrophic incidents, airspace warnings have proliferated in recent years. Expect plenty more in 2025—and, as a result, more disruption.

There are two main kinds of restriction. One is when a country closes its own airspace. This is rare, says David Mumford of Safe Airspace, a free database of air-risk warnings provided by OpsGroup, a membership organisation for aviation professionals. Examples include Ukraine and Sudan. Russia has closed its airspace to airlines from nearly 40 (mostly Western) countries, just as Europe and America have done to Russian ones. As a result,

▶ European and American carriers must now fly much longer routes to destinations in Asia. This puts them at a disadvantage to their Asian competitors that can offer shorter flight times and, because they burn less fuel, lower prices. Air-cargo operations are also affected.

Global connectivity is suffering as a result. British Airways has suspended flights to Beijing until late 2025 and Virgin Atlantic has pulled out of China altogether. Finnair, a Finnish airline which built its business on its “short cut” over Russia, has been among the worst hit. Its executives expect the closure of Russian airspace to last up to a decade. American airlines complain that all this gives Chinese airlines an unfair advantage; they have grabbed bigger chunks of the market on most routes to and from China, compared with 2019. El Al, Israel’s flag-carrier, reported its strongest ever first-half results in 2024, as other airlines stopped flying to Tel Aviv. Indian operators also see opportunity in the woes of Western carriers.

The second kind of restriction is an



airspace warning, when one country advises its own airlines to avoid specific countries. Such warnings are quite common and usually temporary. But they have grown in number in recent years, and are lasting longer. German authorities, for example, now list 17 countries’ airspace as

“hazardous”, up from 13 in 2020. Every fresh escalation in the Middle East causes shivers in airline headquarters the world over. In 2024 the aviation industry organised its first-ever “World Overflight Risk Conference”, an acknowledgment of both the seriousness and the persistence of the problem.

New risks keep cropping up. There have been reports of “GPS spoofing”, or the deliberate disruption of satellite navigation, both in the Middle East and around the Baltic Sea. The main aim is to disrupt drones and missiles, but commercial aircraft are also being led astray. Unpredictable missile attacks by rebel groups in Yemen on shipping traffic in the Red Sea pose risks to planes overhead, too. And even when there is no immediate physical danger, deteriorating relations between countries are a cause to avoid each other’s airspace: no airline chief wants an aircraft making an emergency landing in hostile territory. The world is becoming a more dangerous place, not just on the ground, but in the skies, too. ●

How we did in 2024

It was a year that was full of surprises

Tom Standage Editor,
The World Ahead 2025

WHAT A YEAR. One American presidential candidate bowed out a few months before the election; another was almost assassinated, twice. Ukraine launched a counter-invasion into Russian territory. Iran’s president died in a helicopter crash. We anticipated none of these extraordinary events. And we expected America’s election to be a coin-toss—and failed to foresee the scale of Donald Trump’s decisive victory.

We did better on other elections. There were no prizes for guessing who would win rigged polls in Russia or Rwanda. But the Labour Party won in Britain, Claudia Sheinbaum was elected president in Mexico, Lai Ching-te prevailed in

Taiwan and in South Africa the ANC clung to power, albeit in coalition, all as we expected.

In India, we were right to highlight the lack of enthusiasm for Narendra Modi’s BJP in southern states, which forced the ruling party into coalition. In Pakistan, Imran Khan’s PTI won even though he was in jail and, as we had speculated, senior generals intervened to form a government without him. In the EU elections, the centre-right just clung on as the largest bloc, and Ursula von der Leyen was reappointed as president of the European

Commission, as predicted. In Bangladesh, we said Sheikh Hasina would win the election but face trouble because of her ruthlessness. She fled the country in August.

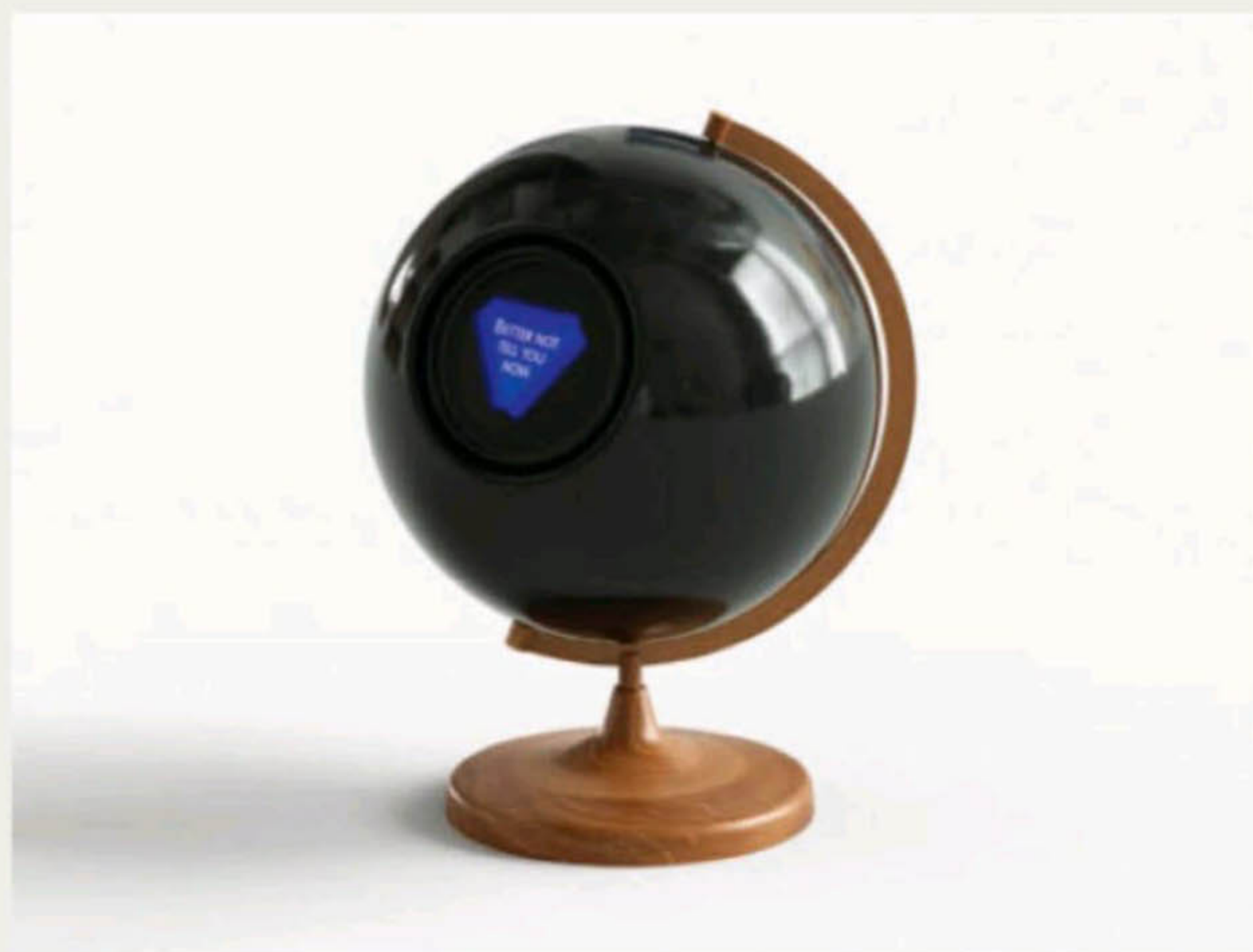
Less accurately, we mentioned Gabriel Attal as a presidential hopeful in France, not as a future prime minister—a job he was appointed to in January, but then lost after snap elections in the summer. We were wrong about Japan, too, predicting that Kishida Fumio would call an early election and win; he stood down in August.

On the economic front, we

correctly foresaw that inflation would moderate, interest rates would start coming down and attention would shift to the sustainability of budget deficits. We said America would avoid a recession, but growth would be tepid; growth was in fact surprisingly strong. We did better on China’s economy, highlighting the risks of deflation and the likelihood of sub-5% GDP growth.

We accurately called a jump in the price of uranium and China becoming the world’s leading auto exporter. Autonomous taxis spread into more cities, and the world was wowed by further test-flights of the giant Starship rocket.

Argentina, though, unexpectedly decided not to join the BRICS. NASA’s Moon mission was delayed. But some events, at least, cannot be derailed by the unpredictable decisions of humans: millions of people saw a total solar eclipse in April. Still, the lesson of 2024 is that, as the saying goes, the world is not only stranger than we imagine, it is stranger than we can imagine. That will not stop us trying to anticipate what will happen in the year ahead.



By Invitation

Three lessons for peacemaking in an unstable world

WE ARE IN the middle of a very violent decade. Since 2020 a series of major wars—in Ethiopia, Myanmar, Ukraine, Sudan and the Middle East—has claimed hundreds of thousands of lives. The number of smaller conflicts is also rising. Over a quarter of countries globally are afflicted by some form of serious violence. The year ahead is unlikely to see much of a let-up.

As violence increases, policymakers in many capitals seem to be losing interest in making peace. The post-cold-war era, now romanticised as an era of stability, was punctuated by wars and massacres from Rwanda to Syria. The International Crisis Group that I lead, a global conflict-prevention organisation, was founded in 1995 after the international failure to halt the Balkan wars. The global “war on terror”, and misadventures like the Iraq war, caused huge suffering. Yet the 1990s and 2000s saw peacemakers and peacekeepers make real progress in countries from Liberia to Timor-Leste.

Today, such peacemaking successes are fading into the past. The last comprehensive peace agreement ending a civil war—between the Colombian government and Marxist rebels—was signed in 2016. As conflicts have spiked in the years since, peacemakers have been able to do little more than craft temporary ceasefires or humanitarian pauses. The United Nations, which was at the centre of international peace efforts 30 years ago, is now a marginal player in Ukraine and Gaza, and losing traction in Africa.

The most obvious reason for this drift is the return of geopolitical competition. America, China and Russia increasingly view regional conflicts in zero-sum terms. This is not only true in cases

Global conflict is rising, but do not give up on peacemaking, argues Comfort Ero, president of International Crisis Group



where they are directly involved, as in Russia's war against Ukraine. The logic of great-power competition is also shaping less strategically significant conflicts. Russia has exploited instability in the Sahel to undermine Western interests in the region, backing military juntas and deploying private military contractors. At the UN, great-power politics has crept into a debate between Chinese and American diplomats over how to deal with criminal gangs in Haiti, because the Haitians recognise Taiwan.

It is politically easier to make the case for funding missiles than mediators

A second driver of conflict is the increasing willingness of middle powers to get involved in fuelling violence. In cases such as Libya and Sudan, regional actors including Turkey and the Gulf states are backing proxies, or deploying their own forces. As the number of participants multiplies, peacemaking grows ever more complicated.

Given these challenges, and the need to focus on other aspects of an ever more complex threat environment, it is understandable that politicians in Washington and elsewhere feel they have less political and financial capital to spend on conflict resolution. It is politically easier to make the case for funding missiles than mediators.

But a failure to get a grip on

the proliferation of political violence is likely to store up trouble over the medium term. In a competitive world, even apparently peripheral conflicts can evolve into far bigger headaches, as Russia's exploitation of the Sahel shows. Equally, Moscow and Beijing may find that refusing to work with the West on issues like North Korea's nuclear programme causes them more trouble over time.

Against this difficult backdrop, my team at Crisis Group and I hold onto the lessons of the past 30 years of conflict resolution. Three stand out. The first is that addressing conflicts before they escalate remains far more effective than waiting for them to burn out of control and trying to make peace. The second is that in almost all conflicts, it is useful to engage all the warring parties to hear how they articulate their perspectives, however hardline and obstreperous they may be.

Third, as much as great-power competition and middle-power engagement are shaping the conflict landscape, local dynamics are often the key to understanding what makes parties fight, and how to persuade them to stop. If we can understand these dynamics, there remains enough shared interest in de-escalating violence, in some parts of the world, that peace-making efforts can still gain traction. In Haiti, China's bickering with America has not stopped the UN greenlighting a peace force, led by Kenya, to start rolling back violence. In Colombia and the Philippines, peace processes aimed at reconciling with rebel groups have had some success and offer hope. The alternative is to allow today's burgeoning list of conflicts to grow further and make an already unstable world more perilous. ●

Europe



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Europe's perilous choice

Go it alone on defence, stick with America or try to muddle through?

Shashank Joshi Defence editor,
The Economist

DONALD TRUMP'S return to the White House is a bombshell moment for Europe. The continent's powers face the erosion, perhaps dissolution, of their principal alliance at the very moment that Russia has the upper hand in the war in Ukraine. They face a stark choice: find an accommodation with the Kremlin or vastly increase spending on defence and security to keep Ukraine solvent and Vladimir Putin at bay. That debate could unite Europe. It is just as likely to split it.

In the months after Mr Trump's inauguration on January 20th European governments will seek to limit

the damage. A cascade of leaders, ministers and officials will try to persuade Mr Trump and his advisers to affirm American commitment to NATO, to continue American aid to Ukraine and to ensure that any peace deal does not condemn Ukraine to permanent subordination. Mark Rutte, NATO's secretary-general, will appeal to Mr Trump's vanity, telling the president-elect that he is single-handedly responsible for European rearmament and that Europeans are vital partners in America's quest to contain Chinese power.

But European governments know they face steep odds. These discussions are likely to unfold amid a blazing global trade war, including American tariffs on Europe. And even if Mr Trump does not formally walk out of NATO, he could hollow out Article 5, its mutual-defence clause, with a few glib remarks.

Mr Trump's Ukraine policy will be shaped by his choice of advisers. The early signs are that mainstream hawks, like Mike Waltz and Marco Rubio, will have to compete with more radical figures such as Tulsi Gabbard and Pete Hegseth. Mr Trump might advocate a version of the deal proposed by J.D. Vance, his vice-president-elect: freeze the front lines and demand that Ukraine remain neutral. He might ask Europeans to deploy troops.

How would Europe respond? One option is to try to muddle through. Perhaps Russia will run out of steam in Ukraine. Perhaps Mr Putin will respect the terms of a ceasefire. Perhaps a pro-European president will return to the White House in 2028. Such complacency has long been Europe's default course of action. But a

▶ second Trump term may persuade European powers that American politics and priorities have changed permanently. Alongside the prospect of a Ukrainian defeat, that could prompt more dramatic action.

The first and most urgent problem is resources: only about two-thirds of NATO's 30 European members currently spend 2% of GDP on defence. Without America, they would need to spend perhaps twice that to have any hope of filling the resulting military gaps. That would mean piling up debt, raising taxes or slashing health and welfare spending. And it would take years—far longer than Mr Trump's four years in office—to rebuild defence industries.

Europeans would also need to decide whether to reorganise the basis of their collective defence. At present, Europe's armed forces have prioritised NATO while also hedging their bets by expanding security and defence capabilities in other institutions, such as the European Union (EU) and regional military blocs such as the British-led Joint Expeditionary Force. Because NATO operates by consensus, Mr Trump could paralyse the alliance in a war, preventing Europeans from implementing its defence plans.

But deprioritising NATO would raise thorny questions. Relying on the EU would risk cutting out Britain, the continent's largest military spender, as well as Turkey, with one of its largest armies. Mr Trump's victory is also likely to prompt a renewed debate over the role of British and French nuclear

A second Trump term may persuade Europe that American priorities have changed permanently

weapons in deterring attacks elsewhere in Europe.

These will be messy, schismatic debates. In northern, central and eastern Europe, particularly among the states of the former Warsaw Pact, governments will fight back against any American efforts to impose a bad deal on Ukraine. Defence spending in the so-called front-line states, already high, will rise further. Yet this hawkish bloc does not, by itself, have the resources or industrial capacity to keep Ukraine supplied, let alone substitute for American military power in Europe. The role of Britain, France and Germany will be crucial.

Britain is joined at the hip with America in intelligence and nuclear matters. It would have the most to lose in a complete break with Mr Trump's administration. France would be bolder, urging the EU to take more radical steps in common defence, such as issuing joint debt to fund military spending. In Germany the pro-Russian far right has gained ground ahead of federal elections in February, but both the two main parties might regard a second Trump term as a catalysing moment, perhaps the sort of emergency that would even justify deficit spending for defence.

In all three cases, it is unclear how governments would respond to a Trump-led peace proposal. To fight it would mean boosting defence spending to buy, produce and send arms to Ukraine. To acquiesce would be to grant Russia a partial victory, give it time to rebuild its forces and agree to live with a new iron curtain—or under the shadow of another war. ●

Ukraine's gloomy end-game

The year 2025 could be when fighting largely comes to an end

Christopher Lockwood Europe editor, *The Economist*

ON FEBRUARY 24TH the war in Ukraine will enter its fourth year. The conflict has already resulted in more than 200,000 deaths and three or four times that many casualties. Millions have been displaced and Ukraine's economy has been devastated. The country faces a demographic time-bomb after the flight of so many women and children.

Russia's economy has been damaged, too, by a combination of Western sanctions, labour shortages caused by Vladimir Putin's insatiable need for cannon fodder, and the flight of many into exile. In early November inflation was in double digits, interest rates were at 21% and 40% of the budget was taken up by military and security spending. Mr Putin's thugs silence critics, but he knows most Russians are fed up.

As Ukraine's citizens shiver through a third winter in which power and heating plants are targets for Russian missiles and drones, there is but one cause for hope: that 2025 could be the year in which the fighting largely comes to an end. Both sides are close to



► exhaustion, and the backers of each would prefer the conflict to wind down. In Washington this will be a priority for Donald Trump's new administration.

Early in 2024 a congressional tussle meant that for several months American funding for Ukraine dried up, as the existing spending package had been exhausted and a new one had not been approved. Some time in 2025 that new \$61bn package will in turn be exhausted, though the new administration seems likely to freeze it before then. Cash is not the only problem. America is running low on some of the military hardware it sends to Ukraine, and needs to consider other partners, especially Israel and Taiwan.

That supply-side constraint is even worse in Europe, where governments have done too little to expand defence production to meet the needs of a Ukraine that will not be able to rely on America. Ukraine itself has increasingly impressive defence industries, particularly in drone production. But it will struggle to fill the gap as Western supplies taper off. All this means that, with America's presidential election out of the way, pressure to enter some form of

Ukraine will have to accept the loss of some territory

negotiations with Russia will greatly increase in 2025.

What might a possible deal look like? Ukraine will have to accept the loss of some of its territory. The 7% that Russia seized in its first invasion in 2014 (the Crimea and eastern Donbas) is surely unrecoverable. Any settlement will probably also involve Russia holding on to some or most of the additional 11% that it now controls since the 2022 invasion. In return, Ukraine must have solid security guarantees, the ideal one being full membership of NATO. That would probably constitute an acceptable solution in Kyiv, painful though it will be for Ukraine to swallow.

With Mr Trump back in power, however, it seems probable that Ukraine will not join NATO for years, if ever; but it might still at least get some form of security guarantee. At any rate, it does at least now seem highly probable that discussions will start in 2025, and when they do the fighting could sharply ratchet down, even to a ceasefire. That is what happened in 2014 (though that ceasefire never wholly held). While talks grind on, a semi-frozen conflict might arise. Imperfect, yes, but much better than the way things are now. ●

A thousand cuts

The coming fiscal squeeze will affect growth, politics and Ukraine

Christian Odendahl European economics editor, *The Economist*

THE EUROPEAN UNION does not seem to have a debt problem. At around 84% of GDP, its member countries' overall public-debt ratio is a lot lower than Britain's 104% or America's 123%, let alone Japan's 255%. Even if the roughly €1trn (\$1.1trn) of collective debt—such as the EU bonds funding the bloc's post-pandemic recovery fund—are included, the ratio does not exceed 90% of GDP. Yet the continent faces a fiscal squeeze in 2025 and beyond that will fuel divisions and cut European growth to almost zero, and may undermine its efforts to step up security spending and continue to support Ukraine.

Low growth is one factor behind the squeeze. Germany's economic growth is practically zero, and there is little prospect of improvement before its federal election in February 2025. France and Italy are still growing, but the OECD, a club of mostly rich countries, reckons both will grow by barely more than 1% in 2025. The downturn is not cyclical but reflects poor growth potential. That will lead to low tax-revenue growth, while spending demands pile up.

The threat of a trade war with America will add to pressures on growth, with the continent especially vulnerable to new trade frictions. Investment banks sharply revised down estimates of European growth after Donald Trump's victory.

Another factor is demography. Ageing European populations add to their states' bills not just via pension spending but also in the health and social-care sectors. An older population is also less productive and innovative, reducing growth further. The EU reckons that, as costs rise, age-related spending will consume a larger share of output in the future: 1.2 percentage points more of GDP by 2070.

Finally, there are the self-imposed rules that mandate cuts. The EU's fiscal rule-book, recently reformed, says countries with high deficits must devise plans to reduce them. Germany has its own constitutional "debt brake" that imposes cuts, even with reasonable deficits. Bruegel, a think-tank, reckons that France,

Italy and Spain will have to reduce their deficits by about 0.5% of GDP per year to comply with the rules.

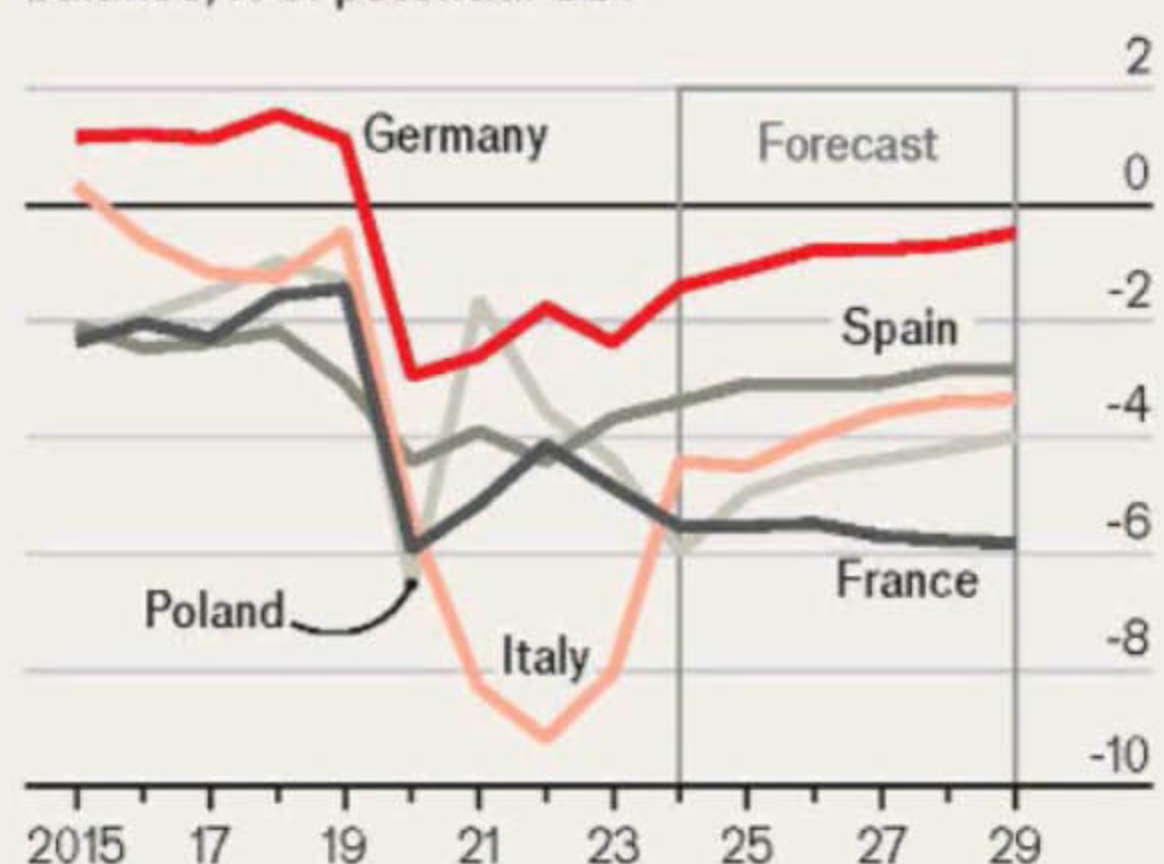
The effect of the fiscal squeeze in 2025 will be even slower growth than forecasters currently project. China will continue to challenge European manufacturing in markets around the world, even as its own domestic weakness hurts European exporters. Mr Trump's victory will entrench and extend protectionist policies put in place by his predecessor. Europe's domestic consumption is increasing, but adding a fiscal squeeze will sap the little growth that will result.

It will also make politics in Europe harder. Germany's election, after the collapse of its government, will be fought over the state of the economy and how Germany's elite have let the former paragon of economic strength fall from grace. The beneficiaries are likely to be those at the political extremes. In France and Spain, where governments are hanging on by a thread, the inevitable fiscal cuts will make them even less popular. Agreeing on sweeping reforms and more common EU spending, as suggested by Mario Draghi, the former head of the European Central Bank, in his landmark report in September 2024, will be just as hard.

The main victim may be Ukraine. The country's military strength and financial health depend on American and European support. For 2025 the G7 agreed on a scheme, still to be finalised, to use profits from frozen Russian state assets to fund about \$50bn of aid, in part because financing it from domestic resources proved increasingly difficult. Should that money run out, Europe will have to make even deeper cuts to fund Ukraine's security—and its own. ●

→ Ready for the squeeze?

General-government structural balance, % of potential GDP



Source: IMF



Balancing act

The year ahead will be perilous for Emmanuel Macron and his government

Sophie Pedder Paris bureau chief,
The Economist

FRANCE IS HEADING for a bumpy 2025. Michel Barnier, the new conservative prime minister, runs a precarious minority coalition. If he can impose a steady hand, he may last the year. But he is up against aggrieved opposition on both the left and right. Divided, these two blocs can merely block his legislative plans. Together, they could bring down his government. By the summer, French voters could be returning to the ballot box again.

Mr Barnier needs to keep his coalition of right-wingers and centrists loyal to President Emmanuel Macron together, while keeping the opposition split. The left will be consistently hostile. This means that, to pass legislation, he will need tacit approval from Marine Le Pen. The hard-right leader will seek to appear responsible but, in effect, the government's survival will be in her hands.

This will give her a lot of clout. She will push for the introduction of proportional representation for parliamentary elections. The conservative interior minister, Bruno Retailleau, will demand tougher policy on

immigration and policing, dismayed left-leaning coalition centrists. Differences in the coalition will be sharpened by the race to succeed Mr Macron at the next presidential election, due in 2027.

A big source of tension will be fixing the dreadful public finances. France's efforts to curb the budget deficit to 5% of GDP in 2025, still well above the EU's 3% limit, will be closely watched by Brussels and financial markets. Big business and the rich will face extra taxes. Mr Barnier's promised spending cuts will meet resistance, in parliament and on the streets.

For the president, the coming year will be uncomfortable. Used to micro-managing policy, Mr Macron will have to learn to delegate. In 2024 he lost European and then legislative elections, after calling a snap parliamentary election. Power will slip increasingly from the Elysée Palace to the prime minister's mansion, Matignon. The constitution bars Mr Macron from dissolving parliament again until July 2025. Even then, fresh elections would not resolve the problem of a split parliament. Political deadlock will intensify calls for Mr Macron himself to step down and hold an early presidential election.

Increasingly detached, Mr Macron will shift his attention abroad. This could play to his strengths, as he pushes for greater European strategic autonomy and maintains his hawkish support for Ukraine and its potential membership of the EU and NATO. But the president's authority abroad will be damaged by weakness at home. Mr Macron's best hope will be that the coalition government beds down and shields him from French grievances. If not, he will be blamed for a year that could bring more political instability than he has bargained for. ●

Poles apart

Europe is watching Poland's crucial presidential election

Vendeline von Bredow Senior Germany correspondent, *The Economist*

POLAND WILL hold a presidential election in 2025, probably in May, that is likely to decide the future of the populist-nationalist Law and Justice party (PiS). Either PiS will be "on a highway to return to power—or it will be the end of PiS as we know it", says Andrzej Bobinski of Polityka Insight, a think-tank in Warsaw. The fate of the party founded in 2001 by Jaroslaw and Lech Kaczynski, identical twin brothers who conquered conservative Poland, will be a bellwether for other countries in Europe where hard-right parties have recently gained increasing power and prominence.

Law and Justice was in power for eight years until October 2023, when a three-way coalition led by the centrist Civic Platform of Donald Tusk, a former president of the European Commission, won parliamentary elections. During its time in power PiS had taken control of the public-service media and packed the judiciary—and in particular the constitutional court, Poland's top court—with its acolytes. It also picked endless battles with the commission in Brussels: over the party's radical overhaul of Poland's judiciary, its disregard for the authority of the European Court of Justice and its refusal to accept its quota of migrants.

The presidency is Law and Justice's last foothold in executive power. Andrzej Duda, the current president, who hails from PiS, backs its policies, though he has reportedly fallen out with Jaroslaw Kaczynski, the party's influential leader. The Polish president lacks the wide-ranging powers of France's president, but is more powerful than his German counterpart, whose role is mainly ceremonial. And he can play an extremely obstructionist role if he chooses to do so, given that he nominates ambassadors, oversees foreign policy and, crucially, has the power to veto legislation.

In December 2023 Mr Duda threatened to veto parts of Mr Tusk's budget over the new government's plans to shut down the public broadcaster, which had become a mouthpiece for PiS. In February 2024 he

► vetoed a law that would have allowed over-the-counter access to the morning-after pill for girls and women aged 15 and above. (Poland's laws on reproductive rights are among the most restrictive in Europe, another legacy of the PiS years.) And in March 2024, when the government announced the recall of 50 ambassadors who had been appointed under the previous administration, a furious Mr Duda claimed he was blindsided by the recalls. He refused to sign off on dozens of new ambassadorial appointees.

Mr Tusk argues that with Mr Duda in the presidential palace his hands are tied, preventing him from implementing the reform agenda he promised his voters. His party's candidate for the presidency is likely to be Rafal Trzaskowski, the popular mayor of Warsaw, who lost to Mr Duda in 2020 by a whisker.

Because Mr Duda may not run again, PiS needs to choose a new presidential candidate. The hot money is on Mariusz Blaszczak, a 55-year-old former defence minister who is a fan of Donald Trump, America's president-elect, because the PiS government that he was a part of had such a good experience during Mr Trump's first term in office. Another possible candidate is Karol Nawrocki, a 41-year-old historian who is the head of the National Institute of Remembrance.

The most hardline possibility is Przemyslaw Czarnek, a 47-year-old former education minister who is known for his criticism of gay and trans rights and his support for corporal punishment for children. Then there is a dark horse: Slawomir Mentzen, a young co-leader of Confederation, a party even more nationalist and right-wing than PiS. Mr Mentzen has a huge following on social media, especially TikTok.

After Law and Justice won parliamentary elections in October 2016, Poland became the only EU country where the hard right controlled both chambers of parliament and the presidency. The reverberations of PiS's eight years in office—and whether it will now find itself making a complete exit from executive power—are thus being closely watched all across Europe as a possible cautionary tale. In October 2023 Judy Dempsey of Carnegie Europe, a think-tank, wrote that "Warsaw's new leadership has a great chance to restore the rule of law, end the country's bitter polarisation, and revive its influence in Europe."

Mr Tusk has tried to seize his chance, but his efforts have often been hindered both by Mr Duda and by his own lack of talent for compromise. His task will become easier if an ally is elected in the presidential election—or much more difficult if someone even more hardline than Mr Duda prevails. ●

Exit Scholz, enter Merz

Under its next government, Germany will shift to the right

Tom Nuttall Berlin bureau chief, *The Economist*

GERMANY WILL enter 2025 preparing for a snap election brought about by the demise of its three-party coalition in November. The surprise vote, to be held in late February, seven months earlier than expected, presents an opportunity for Europe's largest economy to confront its manifest challenges, chief among them its flailing industrial model, and to respond to Donald Trump's return.

Friedrich Merz, the candidate for chancellor from the opposition centre-right Christian Democrats (CDU) and their Bavarian allies, the Christian Social Union (CSU), looks likely to take the reins from Olaf Scholz, the Social Democrat (SPD) incumbent. The 69-year-old Mr Merz (pictured), an irascible old-timer with a long history in the corporate world, will present himself as the best chance for Germany to lift itself from its economic funk. Expect him to campaign to the right of Angela Merkel, the last CDU chancellor, with proposals to reform welfare, attract foreign investment and ease the flow of capital to German firms. Hoping to arrest support for the hard-right Alternative for



↑ Tall order

Germany (AfD), Mr Merz will also talk tough on the irregular immigration that has bedevilled Germany in recent years.

The question of how to revive Germany's economy, which has barely grown in six years, will dominate the campaign and subsequent coalition negotiations. (The new government will also have to negotiate a snap budget, as the country is likely to begin 2025 without one.) Germany's industrial giants are struggling with energy prices, high taxes, red tape and labour shortages, and the country's huge car industry appears to have no answer to the rapid rise of Chinese EVs. Germany's specialised *Mittelstand* firms are highly exposed to the world's protectionist turn, especially amid the threat of Trumpian tariffs. The next chancellor's role in shaping the EU's response will be crucial.

One early test of the next government's ambition could be the fate of Germany's "debt brake", a constitutional provision that sharply limits public borrowing. As spending demands and legal constraints bite, even some in Mr Merz's ranks want to loosen its shackles. It would require a two-thirds majority in the Bundestag. But if that hurdle is overcome and Mr Merz's would-be governing partners can win him over, a modified debt brake could create space for fresh public investment in infrastructure and defence, and allow Germany to boost aid to Ukraine—helpful if Mr Trump pulls the plug. If not, there may be a second off-books fund to boost defence spending, after one Mr Scholz pushed through in 2022.

Diplomacy will present another test. If, perhaps under pressure from Mr Trump, Ukraine arrives at a settlement with Russia, Germany will face demands from allies to provide it with security guarantees and to lead the funding of reconstruction. On EU matters important capitals, notably Brussels, Paris and Warsaw, will expect a Merz-led government to restore a German assertiveness lacking under Mr Scholz, even if it may not always be to their liking. Mr Merz is unlikely, for example, to agree to a big joint-borrowing project to fund EU defence, despite his backing for Ukraine.

Hanging over all this will be Mr Merz's search for coalition partners. A victorious CDU/CSU would probably have to choose between governing with the SPD in a mushy left-right "grand coalition" of the sort often favoured by Mrs Merkel, or with the Greens, who are hated by many conservatives. Yet so fragmented has German politics become that the conservatives may need the support of both. Mr Scholz's throuple of social democrats, greens and liberals began optimistically but was unable to marshal a coherent response when crisis struck. That lesson will not be lost on Mr Merz. ●

By Invitation

Ukraine is a litmus test for the resolve of Europe and its allies

WHETHER WE LIKE it or not, there is no question that the rules-based international order is being irreversibly transformed. The purposes and principles of the charter of the United Nations have been forcefully torn apart by Russia, despite its status as a permanent member of the UN Security Council. With its invasion of Ukraine and its actions elsewhere, Russia is attempting to rearrange the international system in a way that benefits only aggressors.

Europe's current security landscape is just one of multiple burning crises around the world. Russia's aggression has had widespread consequences beyond Ukraine's borders. It has impacted global food security, energy prices and nuclear safety, with humanitarian consequences both in Ukraine and farther afield. In the Middle East, meanwhile, Iran poses a clear and present danger. Israel has a legitimate right to self-defence against terrorist attacks. But conflict in the region has aggravated an already dire humanitarian situation. In today's interconnected world, such crises can and do have far-reaching effects, crossing borders and demanding a comprehensive response.

Ukraine has passed the sobering milestone of more than a thousand days of resistance, fighting to defend its land and people, and to determine its own future. Those days have been filled with bloodshed and destruction, for which Russia bears sole responsibility and for which it should be fully held accountable. But Russia is no longer acting alone.

In a dismayingly development, North Korea has deployed troops under Russian command, while Iran continues to supply Russia with

Europe can achieve long-term peace only if it is prepared for war, says Edgars Rinkevics, president of Latvia



lethal drones and missiles. Ukraine is a litmus test for the resolve of the whole Euro-Atlantic community.

We need to be more resolute, individually and collectively, in supporting Ukraine until it prevails—without being self-deterred by any self-imposed red lines, which have anyhow proven to be a moving target. The risk of escalation lies in not doing enough, rather than in doing too much. Weakness and fear serve only as an invitation for further Russian aggression.

If and when peace talks are

The days when an investment of 2% of GDP in defence was sufficient are behind us

considered, there cannot be any negotiations behind Ukraine's back. Our task for 2025 and beyond is to proactively contain Russia's ability to pose any threats. That includes limiting its efforts to regain military strength. Russia is, and will remain, the most direct and long-term threat to Euro-Atlantic security.

No European can afford complacency, fatigue or neutrality, whether political or economic. Europe can achieve long-term peace only if it is prepared for war. By Europe I mean not only the members of the European Union, but all European members of NATO.

We have a mountain to climb to accelerate defence-industrial production, innovation and technological development in the face of

mounting threats. If we want to be regarded as serious and credible players in the global arena, we need to move from a process-oriented approach to being more clearly results-oriented—and quickly.

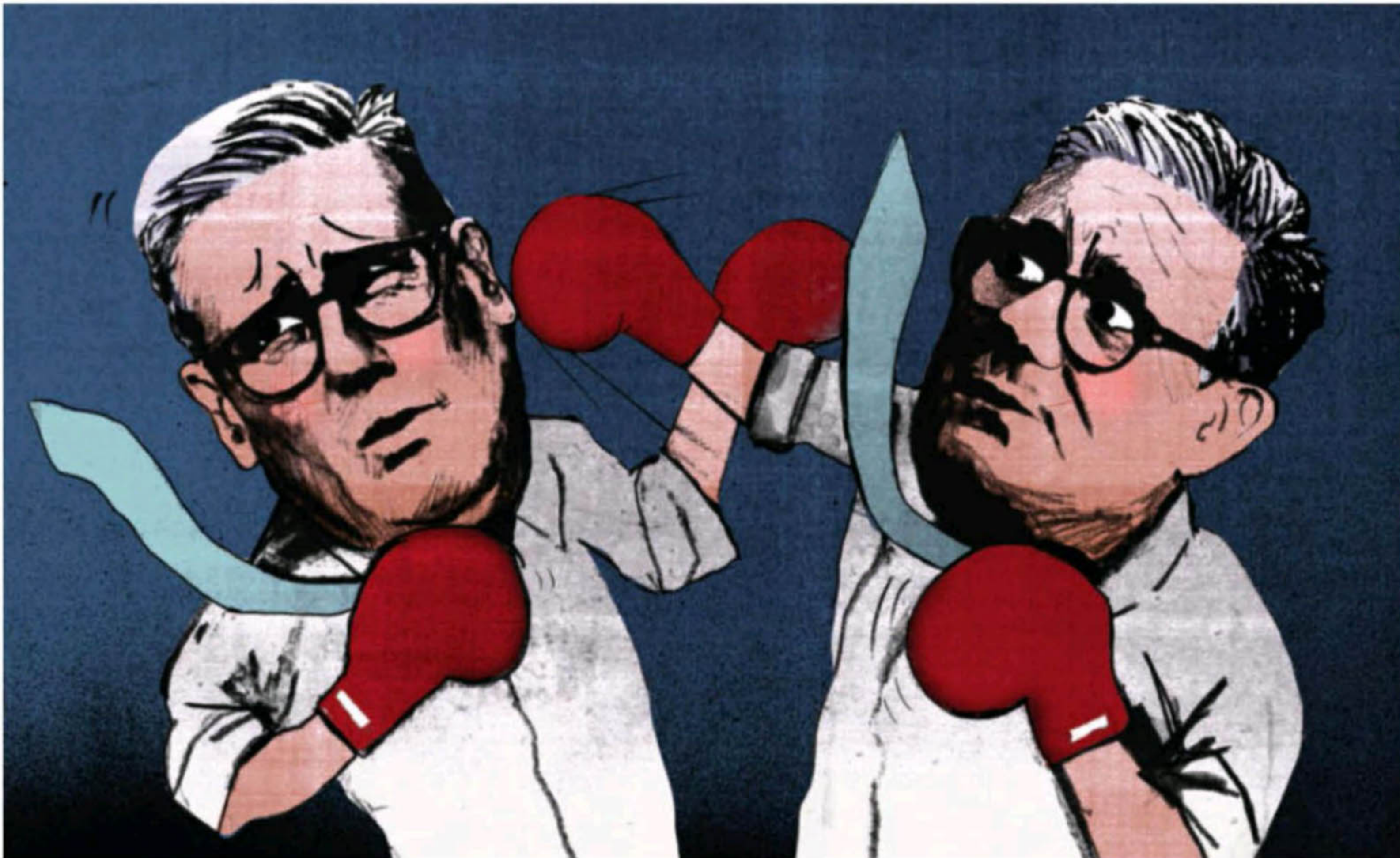
Security is an ongoing adaptation process of planning, resourcing, exercising and implementing lessons learned. The days when an investment of 2% of GDP in defence was sufficient are behind us. Today's required course of action is to move from a level of 2.5% towards 3% of GDP, investing in forces and critical capabilities, and in particular in air defence. These are no longer optional measures, but necessities.

Moreover, we can no longer pretend that old ways of thinking are effective, either on the battlefield or beyond it. Hybrid warfare already tops the risk-assessment charts across Europe. Malign activities by our adversaries (such as sabotage, instrumentalisation of irregular migration and malicious cyber-activities), merged with conventional tactics, require an appropriate mix of both defensive and offensive response measures.

Only by being confidently resourceful will Europe be able to make the case for resolute partnership across the Atlantic and the Indo-Pacific. Britain, France, Germany and Poland have essential roles to play in becoming the generators of credible European deterrence.

European and North America powers need each other, now more than ever. We should not lose our focus and resolve. We must prevent our adversaries and strategic competitors from sowing discord among us. This is not the time for division and disagreement. We must recognise that the basis of our collective future security lies in our unity. ●

Britain



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Backbenchers and backbiting

Labour will spend 2025 doing what it loves: fighting itself

Duncan Robinson Political editor and Bagehot columnist, *The Economist*

THE LABOUR PARTY hates two things, runs the old joke: getting its own way, and each other. In 2025, Sir Keir Starmer's government may have a majority of 154 in the House of Commons; it may sit atop the world's least constrained executive; it may have four clear years to bend the country to its will. Is it happy? Not really. Labour will spend 2025 fighting itself.

Some fights, at least, are over policy. A scrap over Europe will be the aperitif. Backbenchers will grumble that the government should be less cowardly when it comes to Europe. The Labour leadership is so twitchy

it will not even do a deal on student-exchange schemes. Labour's entire electoral strategy will remain focused on a segment of Eurosceptic voters who switched from the Conservatives to Labour at the last election, leading MPs to grumble: what about the rest?

A long-running row over the two-child limit for child benefit may come to an end in 2025, with a decision to abolish it—but not for a few years. More MPs will ask what the point of a Labour government is, if not to lift children out of poverty. At least planning reform, the centrepiece of the government's strategy, is something almost the whole party agrees on.

There will be a by-election. There always is. But one in the north-west, in a safe Labour seat, would cause mild panic if the party lost to a right-wing challenger from Reform UK. Questions about Sir Keir's leadership would start to rumble. The prime minister will turn 63 in September—a few years away from his pension. Anonymous Labour types would be quoted saying he "looks tired". Downing Street sources would hit back that the prime minister scored twice in the most recent game of eight-a-side football that the soon-to-be-pensioner still plays every Sunday.

A tweak to leadership rules might then turn the Labour Party conference in the autumn to its favourite topic of conversation: itself. Rather than allowing its (quite left-wing) members to have the final vote on its leaders, the party will push to give only MPs a say. Framed as a way to keep out the radical left, it is anything but. Before the change, removing a leader was a gamble. This will make it much cleaner.

▶ With Sir Keir still in office, a not-so-subtle battle for succession will begin. A flurry of soft-focus profiles of cabinet ministers will appear in newspaper supplements; scruffy ministers will sharpen up; tubby ones will slim down, flaunting the gaunt, Ozempic-hollowed cheeks that are now the hallmark of the middle-aged and the politically ambitious.

Arithmetic guarantees a certain amount of internal scrapping inside the Labour Party. There are 402 Labour MPs and only 100 or so jobs in government. At the same time, the typical backbencher has a slim majority of a few thousand. For many, a job in government is now or never. With Labour still polling neck and neck with an unpopular—and still defiantly right-wing—Conservative Party, jitters will begin. In a bid to assert authority, Sir Keir will launch a brutal reshuffle. It will not settle things. Old hands in cabinet will be sent to the backbenches to fume; overlooked backbenchers will become increasingly obstreperous.

If Labour can afford to spend 2025 fighting itself, it

**If there is
a political
race, it is to
the bottom**

is because the Conservatives, the main opposition, will be fighting everyone else. Kemi Badenoch, the new Conservative leader, is a political pugilist, and will spend 2025 picking fights with such foes as human-resources departments (parasitical) and the National Trust (unpatriotic). Do not be surprised if she launches an ill-fated push to make “cancelling” people covered by hate-crime legislation. James Cleverly, a Tory leadership contender who argued that the party should “be more normal”, will bide his time.

Sir Keir will end 2025 where he started, level with the Conservatives and leading a strangely fractious party, though he may be a few pounds lighter and with a suspiciously gaunt face. Challenger parties will continue to offer alternatives—from extreme-right to green to a new “technopopulist” outfit—that few seem to want. In Britain in 2025, if there is a political race, it is to the bottom. So, despite all the infighting, Labour will struggle on for three more years, and quite possibly five more after that. ●

Fragmentation is here to stay

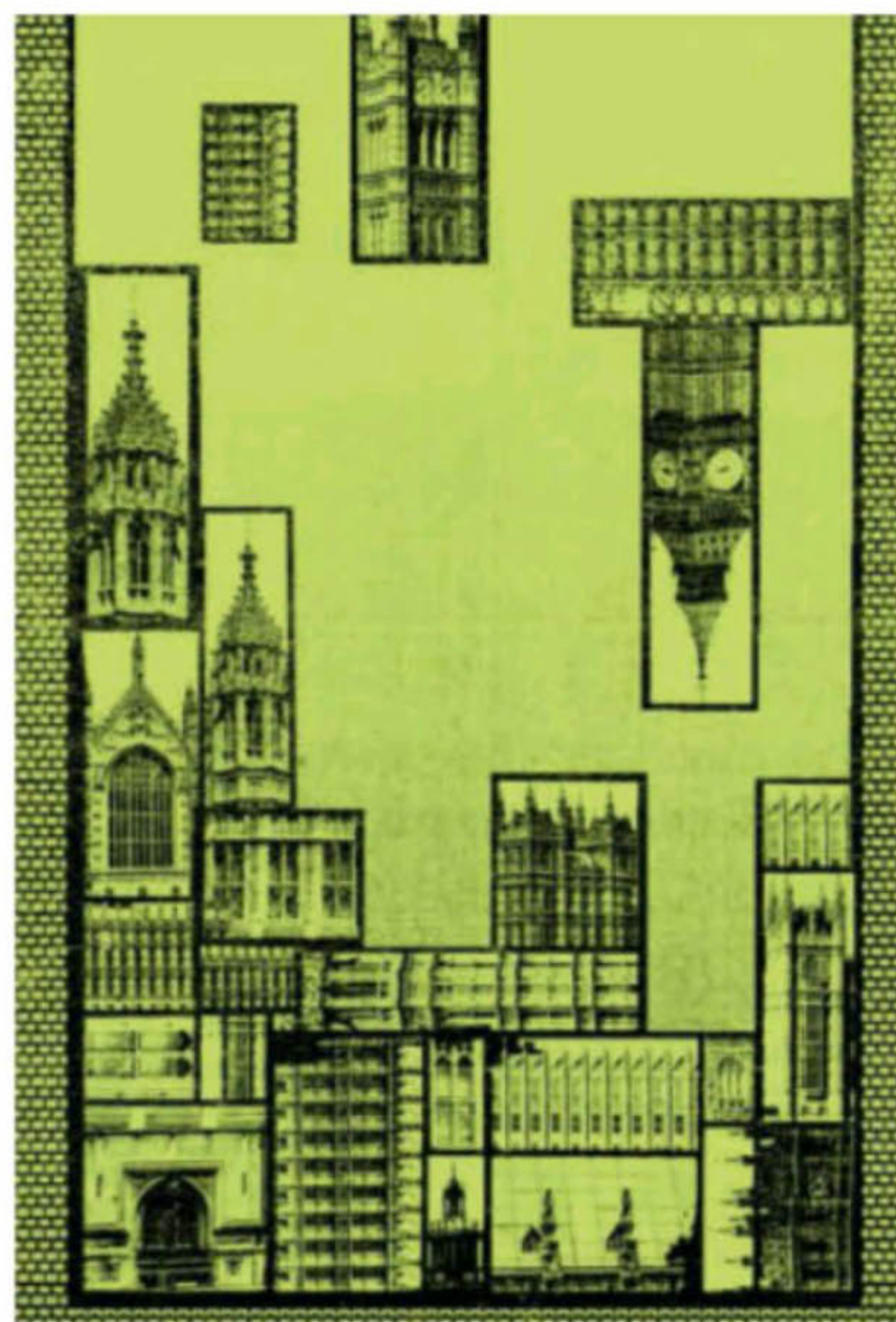
Expect the realignment of British politics to continue

Matthew Holehouse British political correspondent, *The Economist*

GLANCE AROUND the chamber of the House of Commons in 2025 and British politics appears quite stable. A mass of Labour MPs spill over the green government benches and up into the aisles, having tallied more than 400 of a possible 650 seats in the general election of 2024. With their support, the government can legislate more or less as it wishes.

But under the surface, things will be more volatile. Britain's party politics is fragmenting. The first-past-the-post electoral system, which has sustained the dominance of two large parties, is increasingly at odds with the voting habits of the British public. Labour's landslide result represented the biggest mismatch in a century between the popular vote (34%) and the share of seats for a government (63%). The vote share of Labour and the Conservatives combined was, at 57%, the lowest since at least 1918. Smaller parties secured long-sought bridgeheads in the House of Commons. The coming year will reveal whether this fragmentation reverses or, more likely, becomes entrenched.

For the Conservative Party, reversing this development is an existential



challenge. In 2024 it was ousted from government, suffering its worst result since at least 1832, both in vote share (24%) and seats (121 out of 650). Its support split: to Labour, to the Liberal Democrats and especially to Reform UK, a right-wing outfit, which secured five seats. The new Tory leader, Kemi Badenoch, has made clear she intends to put those on the right first. In the contest to replace Rishi Sunak, she stressed immigration control and other issues dear to right-wingers.

An early test of her approach will come in May, with local-government elections in English rural areas where the party has traditionally been strong. The year ahead will also reveal whether Ms Badenoch is willing or able to reach beyond the red-meat issues of the leadership campaign to

build a broad national platform.

Absent from the Tories' leadership contest was much talk of the Liberal Democrats, which was surprising considering that the party secured its best-ever result, bagging 72 seats, many in places long synonymous with prosperous, genteel conservatism. But this success was dependent on former Tory voters feeling relaxed enough about the prospect of a Labour government to defect. That could change if the government gets into trouble.

For the prime minister, Sir Keir Starmer, the task of 2025 is insulating Labour against fragmentation to the left and right—as well as holding on to the voters it gained from the Conservatives. In 2024 Reform came second in 98 constituencies, in 89 of which it was second to Labour. To Labour's left, the Green Party enjoyed its own breakthrough in 2024, winning four MPs. It finished second in 40 constituencies, all but one of them won by Labour.

The Scottish National Party had its contingent of Westminster MPs reduced from 48 to nine in 2024, but it will be angling for a comeback in the year ahead if the new government falls short of its promises. The Scottish Parliament elections of 2026 will be a critical test of its long-term health. And then there is a cluster of independent MPs, mostly in seats with large Muslim populations, who won power by tapping into disaffection with Labour's policy on Israel.

For years the fortunes of the Conservatives and Labour operated like a see-saw: as one fell, the other would inevitably rise. The risk for the parties of the centre is that faith in the already tarnished Labour government continues to fall, without any recovery of faith in the shattered Tories. If so, do not be surprised if support for a change to the first-past-the-post system grows in 2025. ●

Growing pains

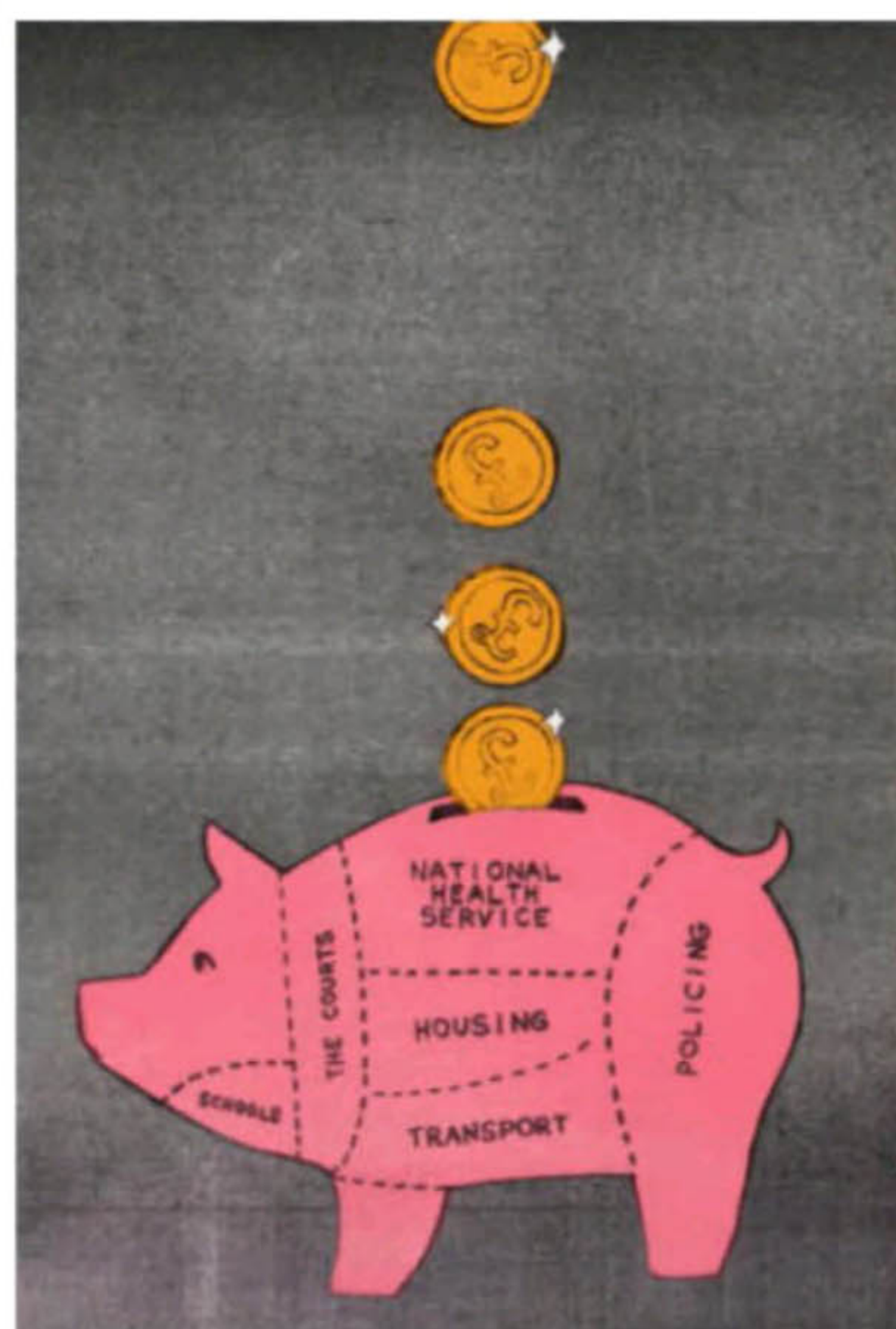
Conditions for economic growth are favourable, but results are uncertain

Archie Hall Britain economics correspondent, *The Economist*

THE BRITISH economy is running out of excuses. Growth has been sluggish for over a decade. Political chaos after the Brexit referendum of 2016 did not help. The covid-19 pandemic and lockdowns certainly stifled growth—as did the surge in energy prices after Russia invaded Ukraine in 2022, and the rise in interest rates after inflation surged.

Now, though, that tumult is over. Inflation is back near its 2% target. Growth picked up in 2024, and forecasts became steadily more optimistic (see chart). Can Britain sustain this in 2025? The backdrop looks good. Interest rates are falling. Politics, at least domestically, is slightly calmer. The new Labour government's policies are not perfect: its urban-housing targets are not ambitious enough, and adopting the previous government's "red lines" on Brexit, another growth-dampener, was also ill-advised. But many policies, especially on infrastructure and housebuilding elsewhere, look promising.

Plenty could still go wrong. Labour has shown occasional enthusiasm for soak-the-rich tax policies that could hinder efforts to lure investors. A global slowdown would hit a medium-size and open economy like Britain's very hard. Trade could deteriorate after Donald Trump is inaugurated, though Britain's skew towards



services exports would probably lessen the impact of tariffs on manufactured goods.

The most troubling scenario, though, would be if everything goes right yet growth still does not materialise. What if the global environment is stable, the government's economic plans stay sensible but growth is still tepid in 2025? That would confirm a deeper, more structural growth problem. One worrying data point is that productivity growth was also weak in the otherwise calm years between the global financial crisis of 2007-09 and the Brexit vote in 2016. Overall GDP growth looked better, but was flattered by a demographic boost from women and immigrants entering the job market. It would be a troubling sign if Britain cannot surpass that weak productivity baseline.

Labour needs robust growth to boost the tax take and pay for its plans to repair public services without another big increase in borrowing. If the Office for Budget Responsibility (OBR), the debt watchdog, nudged down its estimates of Britain's trend productivity growth, the government would lose tens of billions of pounds' worth of fiscal space to borrow. The OBR's assumptions are already rosier than those of most forecasters; it would take a lot to raise them, but not much to pull them down. To win re-election in 2029, Labour must show material improvements to the National Health Service, transport, policing, the courts and more. Without growth it will struggle to deliver them.

Watch the British economy closely in 2025, then. The initial recovery in growth during 2024 was a pleasant surprise for the economy and for the government. But if it cannot be sustained in 2025, it really will be time to worry. ●

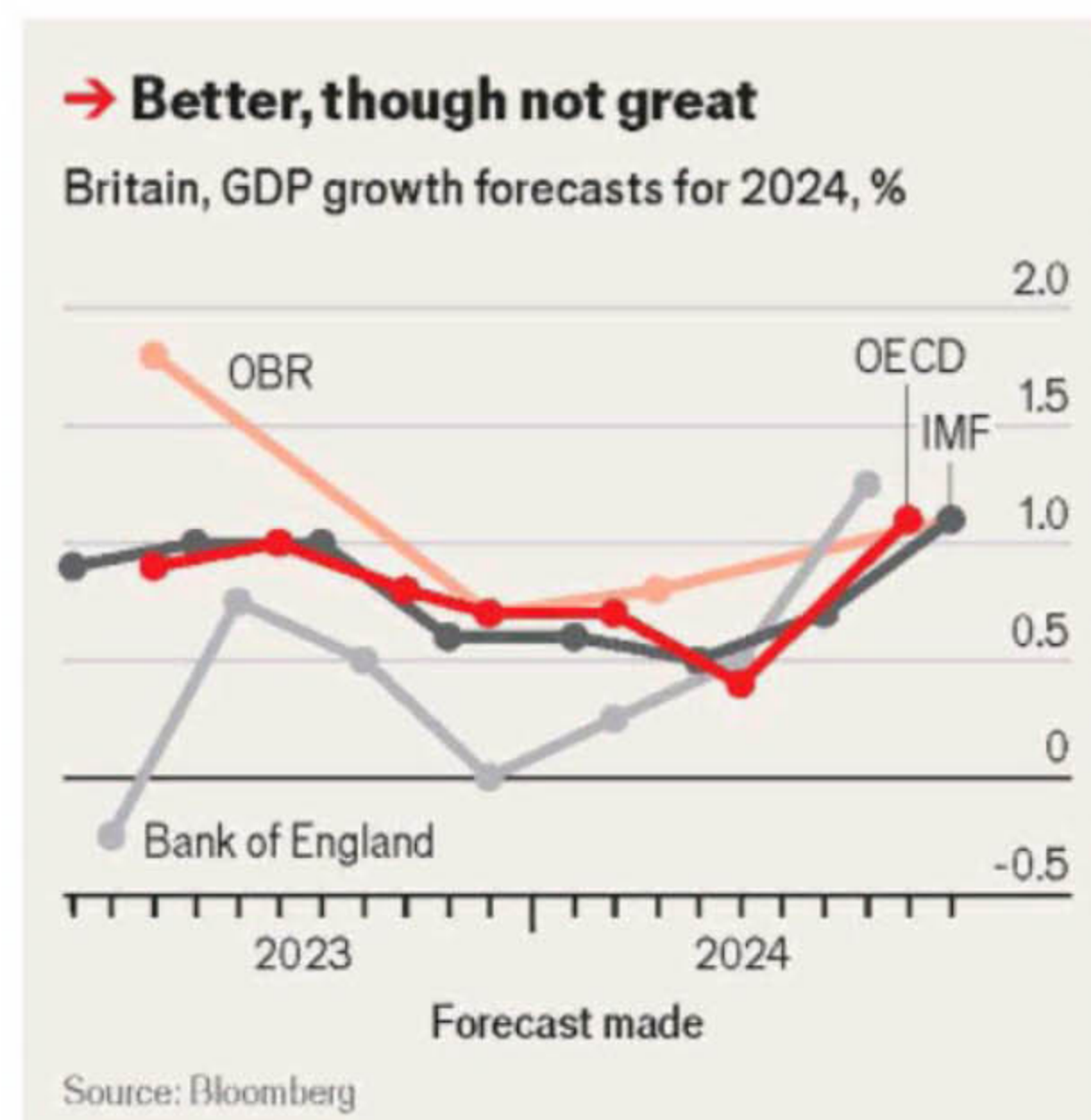
Coastally awesome

A new path will make it possible to walk around the coast of England

Catherine Nixey Britain correspondent, *The Economist*

YOU WILL walk past Pevensey, where William the Conqueror landed, and Margate, where the Spanish Armada did not. You will walk past Plymouth, from where the *Mayflower* famously set sail, and Southampton, from where the *Titanic* infamously did. You will walk past places made famous in poetry and song: past Lyme Regis, where Mary Anning sold seashells on the seashore, past Scarborough Fair, and past the blue birds over the white cliffs of Dover. You will walk along a "footpath through British history", says David Abulafia, a professor of history at Cambridge University, and its "relationship with the sea".

Britain is an island nation. And soon it will be possible to walk all the way round that island, because the King Charles III England Coast Path, as it is formally known, will open. (Wales already has a coastal path, and Scottish rules enshrine the freedom to roam, including along the



► coast.) The English path has been long awaited: the campaign for it began in 2004. It is also long. Its 2,700 miles will make it the longest continuous coastal path in the world. Neil Constable, national adviser at Natural England, which has created the path, hopes that by the end of 2025 it will be possible to arrive at the coast of England, and “turn right or left and follow the national trail as far as you want to go”.

Since the 1930s British walkers have campaigned for the right of access to Britain’s beauty spots. The coastline was one area where this was lacking: prior to the creation of the path access was “patchy”, says Kate Conto, a policy officer at the Ramblers’ Association, which began the campaign. Only about two-thirds of the coastline was accessible. Now the whole lot will be. Such a path is, says Robert Macfarlane, professor of English at Cambridge University and author of several books on walking, “truly an epic prospect—it will connect deep pasts and possible futures, birdsong and industrial heritage, river-mouth and lighthouse”.

Producing that path has, at times, been tricky. Paths that run alongside Britain’s seas have an irritating tendency to end up under water. In some places the coastal path “keeps falling into the sea”, says Darren Braine, a senior adviser at Natural England. This was not merely a logistical problem. It was also a legal one. In Britain a right of way is defined by a mark on a map. It is defined, in other words, by co-ordinates, not common sense.

That means a path remains a right of way, even if the land beneath it crumbles away; even if a sea appears on top of it. Just as the waters to the east of England contain ghostly, fossilised forests from when there was land between Britain and Denmark, they also contain ghostly, submerged footpaths that only fish can use. Which is charming, but rather inconvenient. The new path therefore has “rollback” rights: the right of way will move as the coastline does, so that it is always on land (regardless of where the land may be).

The path, which takes in many of the well-known landmarks of the British coast—its abbeys and castles and lighthouses—might seem to delineate historical continuity. In truth, says Professor Abulafia, it will delineate change. Not just because it will encircle a nation that was once a great naval power and is no longer, but because it will pass things that have now gone. Here it will pass Winchelsea, a once-great port that is now inland due to the accumulation of silt. There it will go past Dunwich, an entire town swallowed by the sea. There is, says Professor Abulafia, a “vanished past that links Britain to the sea”. In 2025, with the opening of the coastal path, that past will become a little more visible. ●

This mortal coil

Assisted dying is set to be legalised in some parts of Britain

Georgia Banjo Britain correspondent, *The Economist*

WHEN ESTHER RANTZEN, a television personality with terminal lung cancer, called for the right to die, she joined a long line of advocates for the cause. Despite widespread public support, several attempts to change the law have failed. In 2025 that pattern will be broken: several jurisdictions within Britain are likely to legalise assisted dying. These will include some or all of England and Wales, Scotland, and the British crown dependencies of the Isle of Man and Jersey.

In Scotland, where an assisted-dying bill has been proposed by Liam McArthur, a Liberal Democrat member of the Scottish Parliament, a final vote could be held by the end of 2025. In Jersey (one of the Channel Islands between Britain and France), where a bill is being drafted, a debate could be held as soon as the summer, with legislation following shortly after. The Isle of Man is perhaps the furthest along. There, a bill should be given royal assent at some point in 2025, though it will not be implemented until 2027.

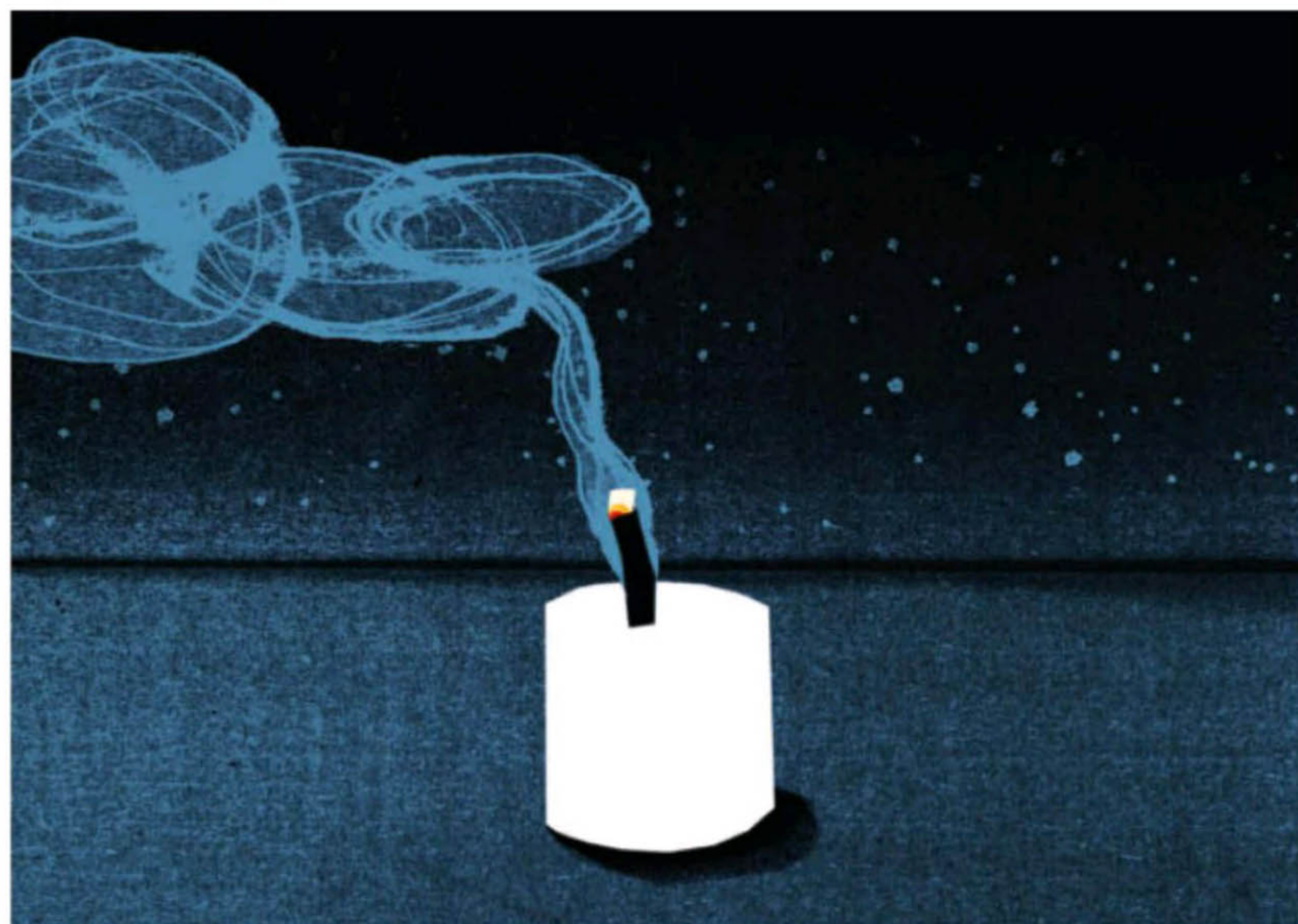
Westminster, by contrast, has been slower to debate an assisted-dying bill. But the idiosyncrasies of parliamentary process mean it could be the first British parliament to pass one. Kim Leadbeater, a Labour MP, introduced her bill to the House of Commons on October 16th, and a debate was scheduled for November 29th.

In previous parliaments, bills have been voted down by cautious MPs, or starved of time by sceptical governments with control of the legislative agenda. This time, though, many new Labour MPs appear supportive, seeing the issue in the way previous generations of lawmakers saw abortion or gay rights. The prime minister, Sir Keir Starmer, himself a supporter, says he will grant MPs a free vote on the issue.

New Zealand and parts of Australia have recently passed laws in the face of resistance from some palliative-care doctors, disability activists and faith groups. Opponents point to Canada, where assisted dying is no longer restricted to the terminally ill (as it is in the American state of Oregon), but is available to people with disabilities who are deemed to be suffering unbearably.

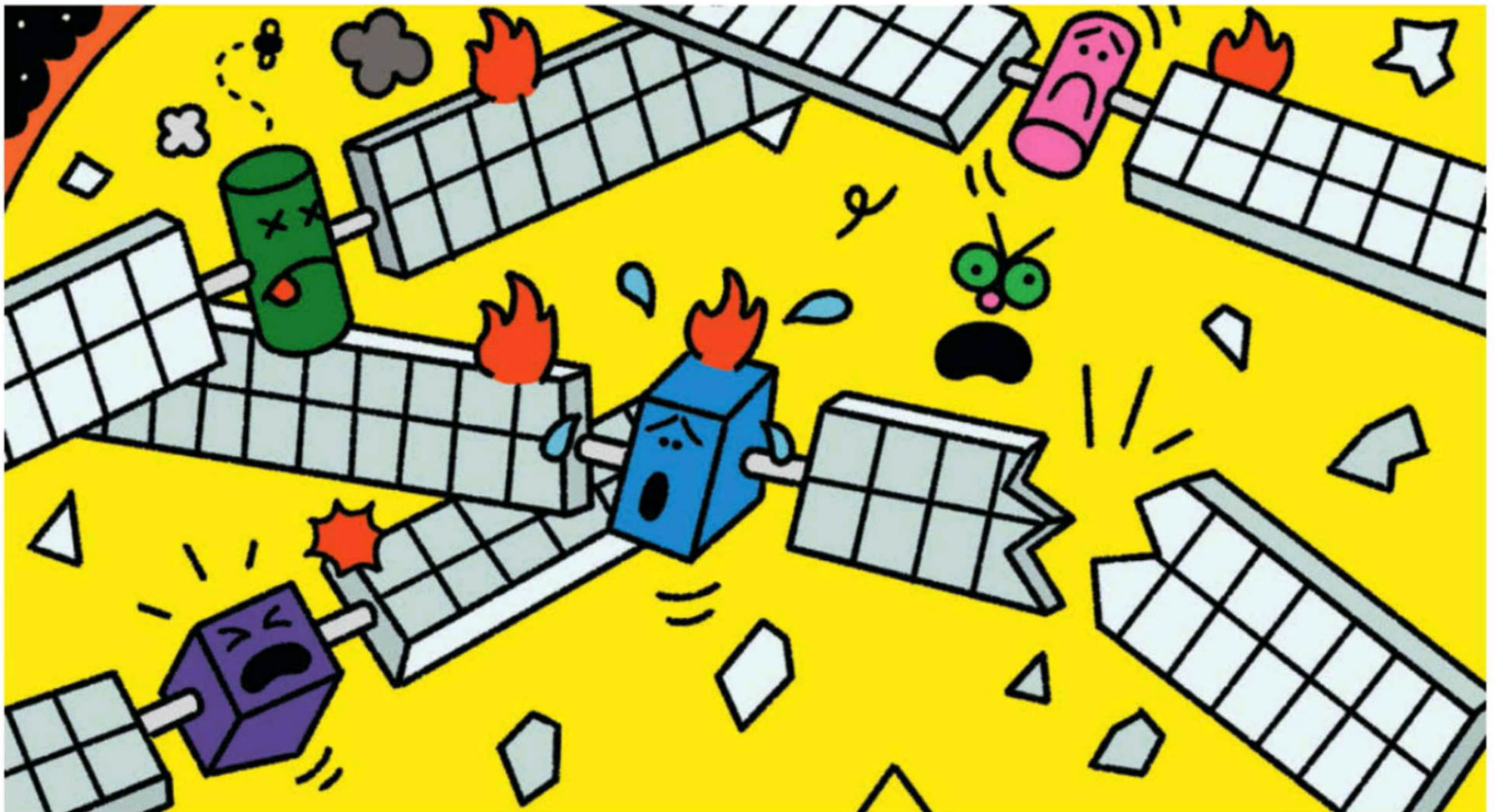
Polls show that two-thirds of British adults support a change in the law, and in reality no British politician will advocate for a regime as broad as Canada’s. All proposed legislation follows Oregon’s narrower model: an applicant must be terminally ill, and their death must be approved by at least two doctors.

The debate will be intense, but change now seems inevitable. France and Ireland are on similar paths. In 2025 some Britons will be given the right to die, signalling that politicians have caught up with public opinion on this controversial subject. ●



Wild cards

In the modern age, the unbelievable has become commonplace. Entire countries are shut down by a global pandemic. Cajoling an artificial intelligence to do useful things is a real job. A giant rocket returns to Earth and is caught by steel “chopsticks”. Bombs hidden in exploding radios kill dozens of people. Self-driving taxis are a hit with tourists in San Francisco. To navigate the future, it can help to anticipate the unlikely. Here are ten unbelievable-sounding things that could happen in 2025



A SOLAR STORM CAUSES GLOBAL DISRUPTION

Eruptions of plasma from the surface of the Sun, known as coronal mass ejections (CMEs), can shoot billions of tonnes of energetic particles into space. If the Earth is in the path of such an eruption, the result can be geomagnetic storms and widely visible auroras, as charged particles slam into the Earth's magnetosphere. At solar maximum, the peak of its 11-year cycle, the Sun can produce two or three CMEs per day, compared with one a week at solar minimum. And the Sun is currently at solar maximum in an unexpectedly active cycle—hence the unusually

vivid displays of auroras in May and October 2024, with the Northern Lights visible as far south as Sicily and Alabama.

As well as producing spectacular light shows, such solar storms can cause problems. These include short-wave radio blackouts and disruption to power grids, as currents are induced in cables and transformers. In 1989 a solar storm knocked Quebec's grid offline for nine hours, and a CME that narrowly missed the Earth in 2012 could have destroyed a quarter of America's high-voltage transformers, according to one analysis. CMEs can also affect satellites, by causing the

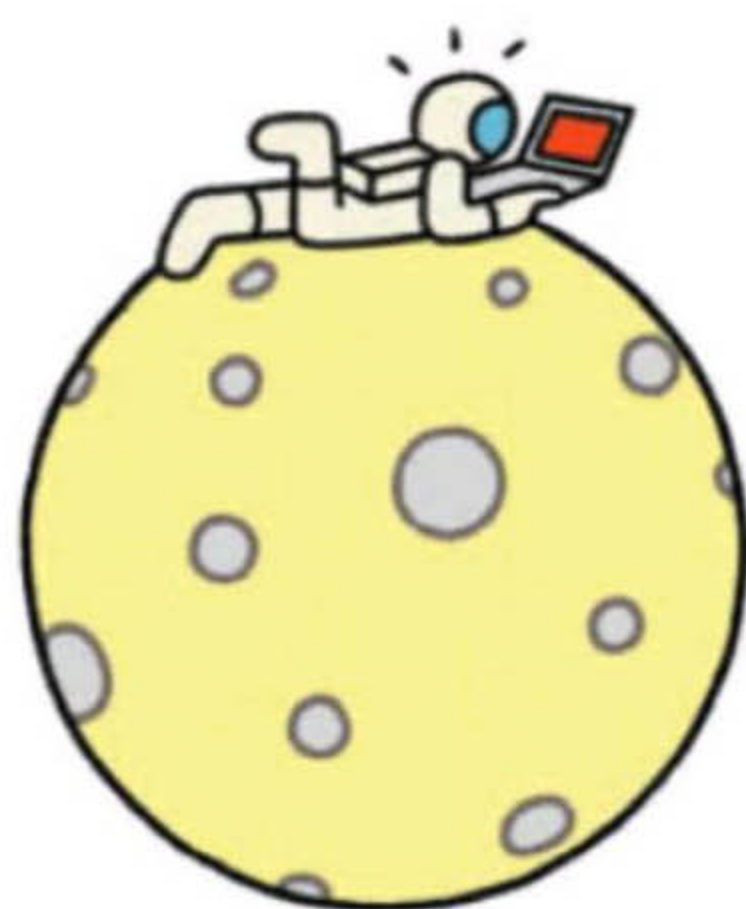
atmosphere to swell slightly, increasing drag on those in low orbits. In February 2022 a CME led to the loss of 38 satellites.

The most powerful recorded solar storm, which occurred in 1859, is known as the Carrington event, after one of the astronomers who observed it. Auroras were visible even close to the equator, in Cuba, Jamaica and Colombia, and electric telegraphs across Europe and America were disrupted.

Were a large solar storm to occur in 2025, its impact could be far greater than any in the past, because of humanity's greater dependence on technology. A report prepared

in 2013 by Lloyd's, an insurer, estimated the cost of such an event in America alone at \$0.6trn-2.6trn. It could take months to repair damage to electrical grids and restore power. Water and food supplies would be interrupted. Thousands of satellites could be disabled, including those used for navigation, disrupting global aviation and shipping.

Solar physicists put the odds of a Carrington-level geomagnetic storm some time in the 2020s at around one in ten. And analysis of carbon-14 levels in tree rings suggests there were solar storms in the 8th and 10th centuries that were ten times more powerful.



A 4G MOBILE NETWORK GOES LIVE ON THE MOON

A new Moon race is under way. A variety of robotic space probes have been sent to its surface in the past few years, both by national space agencies and private firms. Not all have worked as planned: some have crashed into the surface, or toppled over after landing. The complexity of Moon landers has been increasing, with some carrying rovers, small robots or cameras that detach during descent. The main vehicle then acts as a radio relay, beaming signals from these other devices back

to Earth. In 2025 a Moon lander built by Intuitive Machines, an American startup, will try out a new approach to such lunar networking: it will contain a small 4G cellular base-station, made by Nokia.

If all goes well (and recent Moon landings have had a decidedly mixed record), this will allow a rover and a small “hopper” robot to use standard 4G technology, like that found in smartphones, to communicate with the *Athena* lander as they explore the landing site near the lunar south pole. The use of 4G is part of a wider trend of cutting costs by using commercial, off-the-shelf technology in space missions, rather than inventing entirely new ways of doing things.

The IM-2 mission, which is funded by America’s space agency, NASA, is due to blast off as soon as January 2025. The idea is that when American astronauts eventually return to the surface of the Moon, they will be able to use 4G to communicate with each other—and to phone home.

A SPORTS TOURNAMENT ENCOURAGES DOPING

The world’s sporting bodies go to great trouble to try to ensure that athletes do not gain an unfair advantage by using performance-enhancing drugs. As a series of doping scandals demonstrates, however, their methods are far from foolproof. But what if doping was not just allowed, but encouraged?

That is the idea behind the Enhanced Games—a sports tournament where competitors are allowed to use drugs and technological aids to gain a competitive edge in athletics, swimming, weightlifting and other disciplines. The entrepreneur behind the idea, Aron D’Souza, has been trying to get it off the ground for several years. But he now has Peter Thiel and other billionaire investors on board, and has struck a deal with the production company owned by Ridley Scott, a Hollywood director, to make a ten-part television series about the first tournament, which Mr D’Souza says will take place in

the second half of 2025.

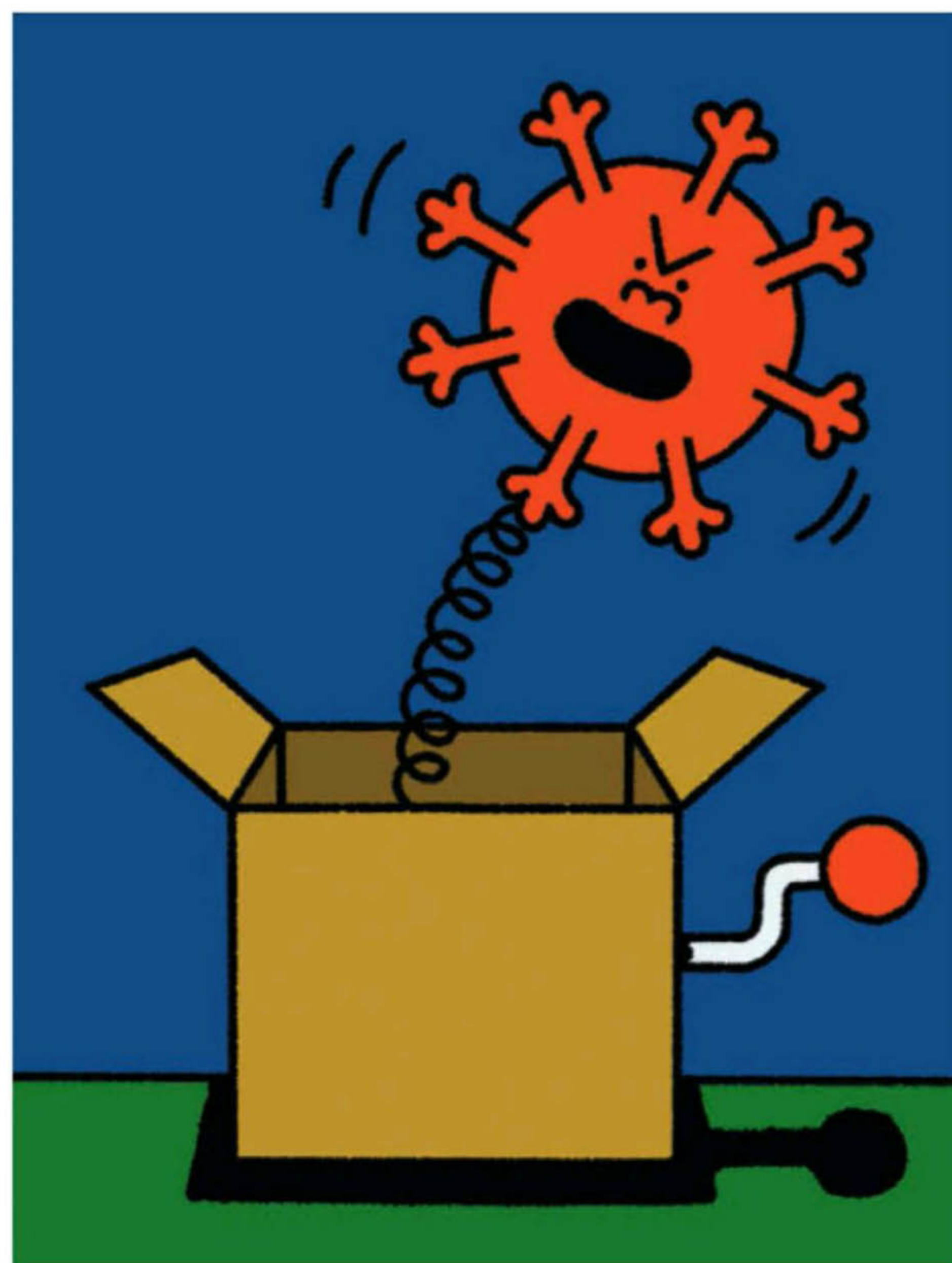
Critics of the scheme, including officials at anti-doping agencies, are appalled. They point out that steroids and other kinds of performance-enhancing drugs can endanger athletes’ health. Mr D’Souza insists that safety is paramount, and that monitoring the use of drugs is safer than using them in secret (which, he claims, is what 44% of athletes are doing). But he has yet to close the deal with a host city, and faces a struggle to sign up competitors. Will his Enhanced Games manage to get out of the starting blocks?



A NEW GLOBAL PANDEMIC BREAKS OUT

What, another one? Already? Surely not! But one of the surprising things about the covid-19 pandemic, in retrospect, was the length of the interval after the previous pandemic of comparable scale and severity, in 1918. After all, the global population soared during the 20th century, cramming billions of people into cities, while the advent of global aviation made it easier than ever for bugs to spread across borders.

Researchers had long highlighted the risk of an outbreak, either from a familiar pathogen such as an influenza virus, or an unfamiliar one: in 2018 the World Health Organisation (WHO) warned that “a serious international epidemic could be caused by a pathogen currently unknown to cause human disease”. In the event it was a novel coronavirus that spread around the world starting in late 2019. It is now a matter of when, rather than if, the next major pandemic



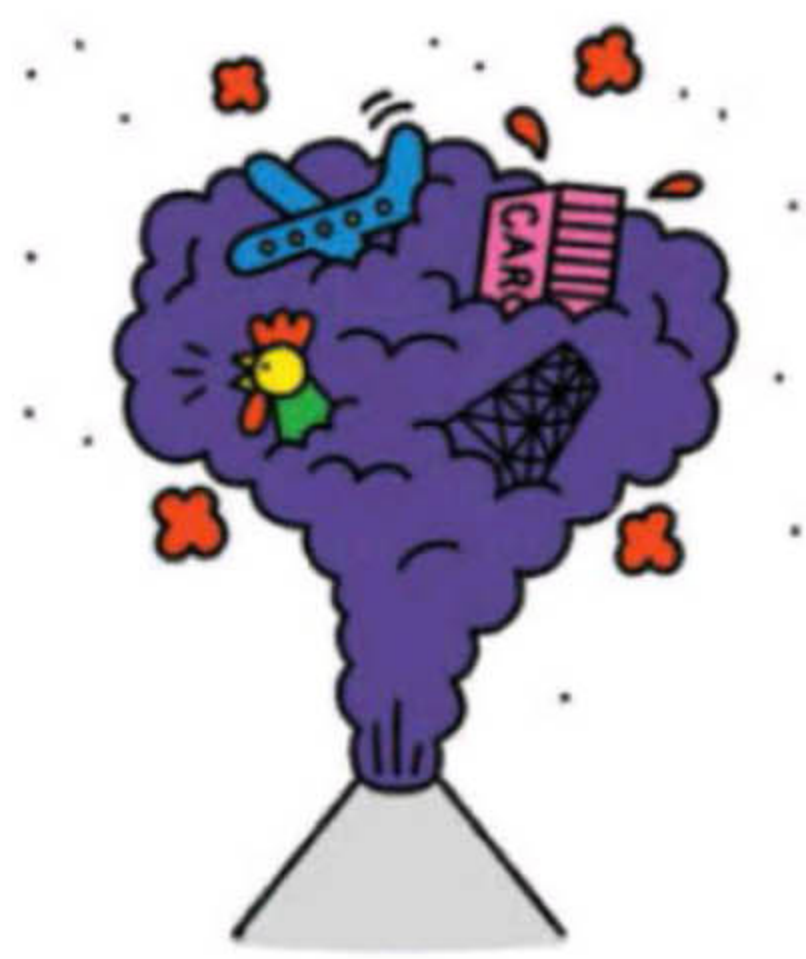
occurs. And the gap is unlikely to be another century.

In July 2024 the WHO updated its list of “priority pathogens” that could trigger a pandemic, the number of which has grown to more than 30. Among those added to the list were influenza A viruses, commonly known as bird flu, which can also infect mammals, including humans. One strain, H5N1 clade 2.3.4.4b, has been spreading since 2020, exchanging genes with other flu viruses as it goes, and infecting wild birds, seals, dairy cows, poultry and some humans. This virus is being watched closely, and has been detected on all continents, including Antarctica.

During 2024 America notably failed to bring an outbreak among farm animals under control, resulting in several known human cases (but no deaths). This virus is arguably the most plausible candidate to cause the next global pandemic. But just how dangerous it would be depends on whether it mutates further.

A MAJOR VOLCANIC ERUPTION CAUSES CHAOS

The world is “woefully unprepared” for the disruption that would be caused by a really large volcanic eruption, according to Michael Cassidy, a volcanologist at the University of Birmingham, and Lara Mani, who studies risk at the University of Cambridge. Writing in *Nature* in 2022, they described the eruption of a volcano in Tonga in that year, the largest since Mount Pinatubo in 1991, as a “near miss” that should be treated as a wake-up call. A really large eruption, like that of Mount Tambora (in modern-day Indonesia) in 1815, would cool the climate, affect food production and could disrupt aviation, shipping and communications infrastructure for months or years. Analysis of ice cores suggests there is a one-in-six chance of such an eruption, classified as magnitude 7 on the scale used by volcanologists, this century. Yet far more resources go into monitoring the smaller risk

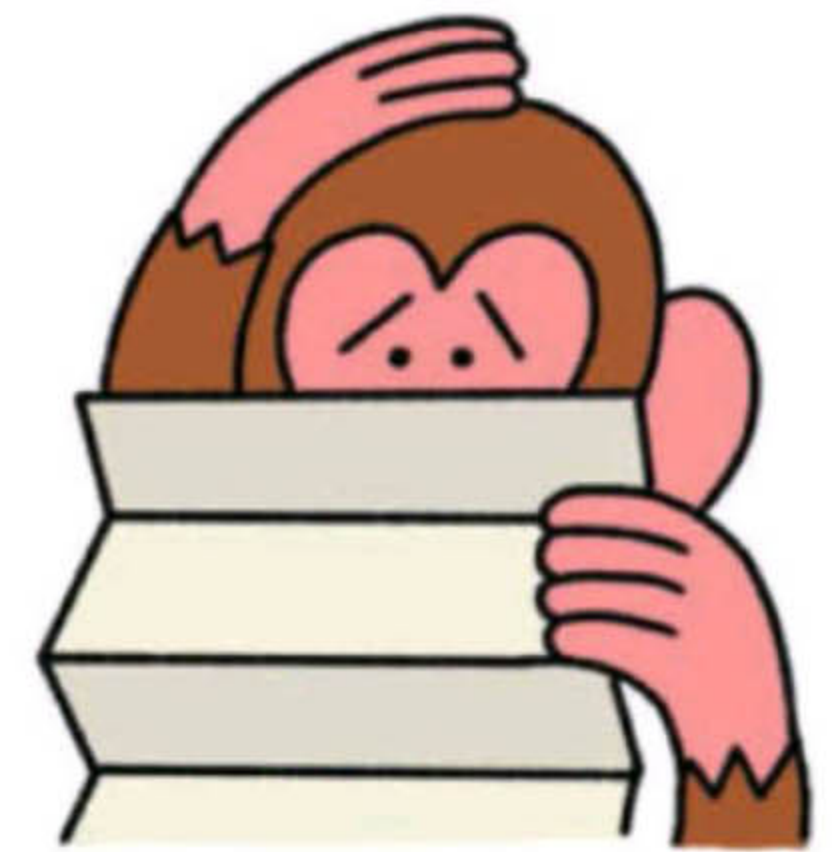


from asteroids than into volcano monitoring, Dr Cassidy and Dr Mani note. They have called for more sensors, including the launch of a satellite dedicated to monitoring volcanoes, and more emphasis on preparedness. As 2025 dawns, some volcano-watchers are looking nervously at Iceland, where an eruption abruptly shut down transatlantic air travel for a few days in 2010; others are worried about volcanoes close to large population centres in Italy, Indonesia and the Philippines. A really big eruption would have a global impact.

ANIMALS GET THEIR OWN BANK ACCOUNTS

What if animals had their own pots of money, and could spend it in ways to promote conservation and biodiversity, increasing their chances of survival? That is the idea behind “interspecies money”, a concept being developed by Tehanu, a technology outfit. It has already launched a trial involving a family of 19 mountain gorillas in Rwanda, and in 2025 it hopes to extend this scheme to cover all gorillas in the country. In the coming year it also hopes to launch a separate project to help protect the straw-coloured fruit bat, which is found across central Africa and plays a valuable role in seed dispersal. Tehanu’s system uses sensors and artificial intelligence to determine the needs of the animals—for example, that a poacher’s snare needs to be removed, or that an individual gorilla requires veterinary treatment. It then recruits a nearby human to do this work, via an online services platform

that the company calls “the gig economy for nature”, and issues a payment once it is complete. In this way, animals can direct their funds to local workers in accordance with their needs and those of the ecosystem they inhabit. Tehanu’s aim is to show that distributing conservation funding in this way is transparent, produces verifiable results and creates sustainable jobs—as well as protecting the animals, their habitats and the ecosystem services they provide. Humans can make digital payments verified by facial recognition, so why shouldn’t gorillas?



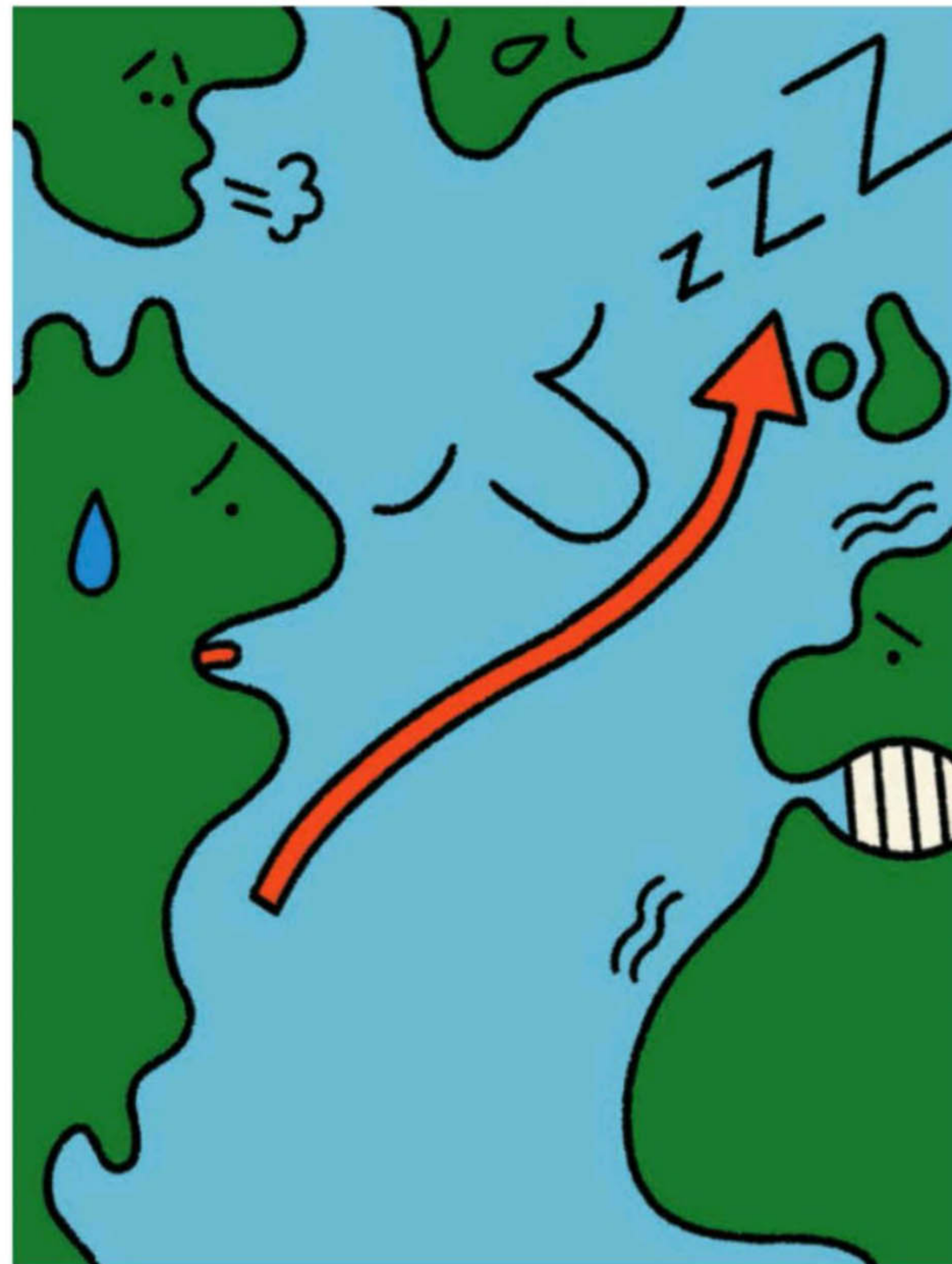
RUSSIA DEPLOYS A NUCLEAR WEAPON IN SPACE

The Outer Space Treaty of 1967 bans territorial claims on celestial bodies and the stationing of nuclear weapons in space. But in February 2024 the chair of America’s House intelligence committee warned that Russia was developing a new space weapon, which intelligence sources believe involves a nuclear warhead that can be detonated in orbit to knock out satellites. Nuclear weapons have in fact been detonated in space before: both America and the Soviet Union performed high-altitude nuclear tests in the early 1960s, before signing the treaty of 1967. The resulting electromagnetic bursts affected satellites, which were few in number at the time. But today there are thousands of satellites in orbit, serving a range of civilian and military purposes, which would be vulnerable both to the radiation from a nuclear blast and to the orbital debris it would create. In recent years

America, China, India and Russia have tested a range of other anti-satellite capabilities, including ground-based missiles and lasers. In November 2021 Russia destroyed a defunct Soviet-era satellite using a Nudol hypersonic missile. The destruction of the satellite created 1,800 pieces of space debris and forced astronauts in the International Space Station (including two Russians) to shelter in their escape craft. Russia has also deployed a series of “nesting doll” satellites; the latest, Cosmos 2570, launched in October 2023, released a second vehicle, which then released a third, in what appeared to be a test of an orbital anti-satellite weapon. An orbiting nuclear weapon would be much cruder and much more devastating; its main value would be as a threat. Were Russia to launch such a weapon in 2025, it would cause widespread alarm. It would also demonstrate that the idea of war in space is, increasingly, no longer science fiction.

A KEY NORTH ATLANTIC CURRENT SLOWS OR SHIFTS

The Atlantic meridional overturning circulation (AMOC) is a network of currents in the Atlantic ocean that circulates warm water northwards and cold water southwards. This helps distribute nutrients that sustain ocean life, and means some parts of the world are warmer than they would otherwise be. The AMOC is considered a key “tipping point” in the global climate system, and analysis of ice cores suggests that shifts in the AMOC’s flow have been associated with abrupt climate change in the distant past. More recently, researchers have found, there are signs that the AMOC has been weakening over the past century. An analysis by researchers at the University of Copenhagen, published in 2023, concluded that there is a 95% chance that the AMOC will collapse between 2025 and 2095, with the most likely date in the 2050s, if greenhouse-gas



emissions continue on their current trajectory. Other researchers have cast doubt on whether something so drastic can be predicted with such accuracy, or indeed at all. But even short of a collapse, changes to the AMOC are worth watching for, because any shift could have far-reaching impacts. Northern Europe could get colder and drier, with more powerful storms, shorter growing seasons and summers more prone to drought. The ocean temperature on America’s north-east coast could rise further, affecting fisheries, accelerating the melting of the Greenland ice sheet and causing sea levels to rise. And the “intertropical convergence zone”—the tropical belt where the weather systems of the two hemispheres meet—could move south, causing droughts in Africa and Central America that would affect tens of millions of people. Climate change is a gradual process, but a shift in the AMOC could be far more abrupt.



A LOST TEXT FROM ANTIQUITY IS DISCOVERED

When Mount Vesuvius erupted in 79AD, burying the Roman town of Pompeii, hot gases from the volcano also flash-fried the library of a villa in nearby Herculaneum, carbonising (and thus preserving) thousands of papyrus scrolls containing Greek and Latin texts. Efforts to unwrap and read the scrolls physically, starting in the 18th century, all failed; a few words were sometimes visible, but the scrolls disintegrated. Then in 2023 researchers used a combination of X-ray scanning

and artificial intelligence to reveal passages of text inside one scroll. (The breakthrough occurred when Nat Friedman, a technology investor, put the X-ray scans online and offered a \$1m prize to anyone who could decode them.) The text, extracted by a team of student volunteers and analysed by papyrologists, turned out to be a previously unknown work by Philodemus, a Greek philosopher who had lived in Herculaneum. As more scrolls are scanned and analysed, what other lost works might soon be discovered? Perhaps a trove of Julius Caesar’s correspondence, given that the villa once belonged to his father-in-law. Other tantalising possibilities include lost tragedies by Sophocles or Aeschylus; missing historical books by Livy; unknown poems by Sappho; copies of the Acta Diurna, the Roman state’s daily news bulletin; or perhaps an eyewitness account of the activities of a certain itinerant preacher in first-century Judea?

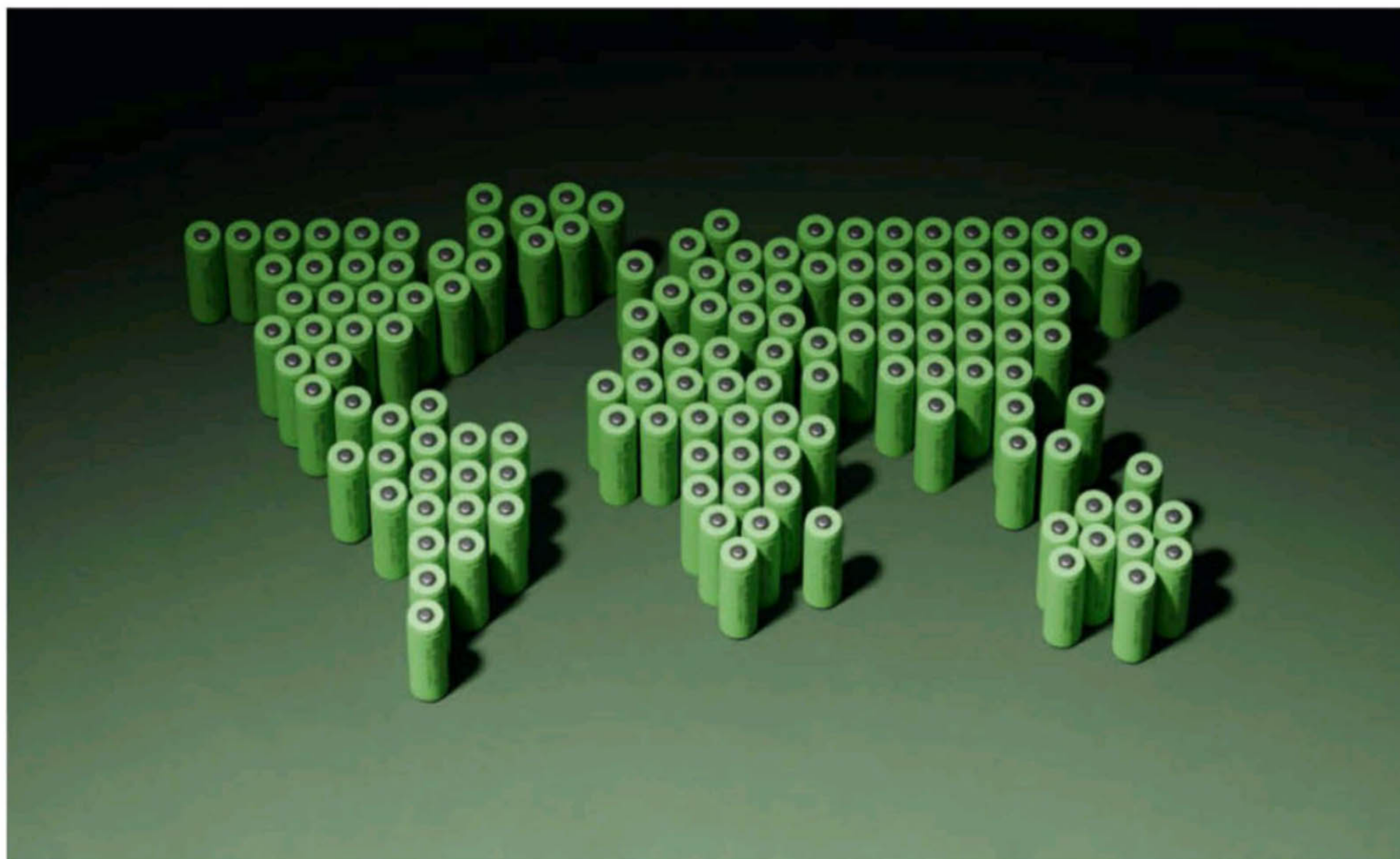
EVIDENCE OF ALIEN LIFE IS DETECTED

Where is everybody? That was the question posed by Enrico Fermi, a physicist, in 1950. Given the enormous age of the universe, alien civilisations have had plenty of time to spread out, yet humans have not seen any trace of them. It is not for lack of trying. And one of the various efforts dedicated to the search for extraterrestrial intelligence (SETI) could strike gold at any time. Most such efforts rely on analysis of radio signals, with data from radio telescopes in Australia, South Africa and America being



scrutinised for signs of alien transmissions (essentially, anything that doesn’t look natural, such as odd patterns that repeat regularly). Other approaches to SETI involve looking for laser flashes (on the basis that aliens might use light rather than radio for long-range communication), hunting for the tell-tale glow of potential “Dyson spheres” (vast, shell-like structures that aliens might have built around stars to capture as much of their radiation as possible), and analysing the atmospheres of planets around other suns, thousands of which have been discovered in recent years, for evidence of biological activity. Searching for aliens, once regarded as a fringe activity, has become part of mainstream research, and more scientists are now engaged in it than at any time in the past. Might they find something in 2025? Any discovery, if it happens, will come without warning—and it would have a profound effect on humanity’s perception of its place in the universe.

Business



Energy's next big thing

NEW YORK

From giant batteries to compressed gas, grid-scale energy storage is booming

Vijay Vaitheeswaran Global energy and climate innovation editor, *The Economist*

ENERGY STORAGE for the electrical grid is about to hit the big time. By the reckoning of the International Energy Agency (IEA), a forecaster, grid-scale storage is now the fastest-growing of all the energy technologies. In 2025, some 80 gigawatts (GW) of new grid-scale energy storage will be added globally, an eight-fold increase from 2021.

Grid-scale energy storage is on the rise thanks to four potent forces. The first is the global surge in deployment of solar and wind power, which are intermittent by nature. That did not matter when only

small amounts were used on the grid, but they can now make up half or more of generation capacity in some markets, creating a headache for grid operators on cloudy and still days. Big batteries attached to the grid, which store energy when it is abundant and release it when it is needed, solve that problem neatly. The IEA predicts that in 2025 the combination of solar-photovoltaic generation and battery storage will be cheaper than the cost of coal-fired power in China, and new gas-fired plants in America.

The second factor boosting energy storage for the grid is Chinese overcapacity in battery manufacturing, which has led to a big drop in the price of lithium-ion batteries, the kind used in laptops, smartphones and more recently electric vehicles (EVs). Since 1991 the price has plunged by 97%, and in 2025 prices for grid batteries will converge with the historically much lower prices for EV batteries (see chart). As growth in EV sales has slowed and the lithium-ion battery glut has expanded, battery-makers in Asia have been forced to find new buyers. For the first time, the market for grid batteries in China now exceeds that for consumer electronics, and will grow further thanks to policy mandates requiring the deployment of grid-scale storage with wind and solar farms.

A third boost for energy storage is the power-guzzling surge driven by the rise of artificial intelligence (see next story). Goldman Sachs, a bank, reckons that global power demand at data centres will rise from 240 terawatt hours (TWh) in 2020 to 600TWh in 2025. But tech giants have noisily committed to

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- ▶ climate-friendly goals such as net-zero emissions, which means they cannot turn to coal and gas plants. They need vast amounts of renewable energy, with storage to ensure power is provided round the clock.

The fourth and most intriguing of the forces at work, though, is the rapid emergence of innovative energy-storage alternatives that go beyond conventional lithium-based batteries. Sodium-ion batteries are a promising alternative, being cheaper and less flammable. This is particularly attractive for operators of data centres, who can get cheaper insurance by avoiding lithium. BloombergNEF, a research firm, expects makers of sodium batteries, led by China's HiNa, to begin large-scale manufacturing for grid storage in 2025. Form Energy, an American startup, has raised \$1.2bn to develop a low-cost battery based on iron-air chemistry. It will start operations in 2025 in California and Minnesota.

Other energy-storage systems use gravity. Switzerland's Energy Vault has developed a hybrid system involving pumped water and lithium batteries which it plans to test in 2025 in a 500-metre mineshaft in Sardinia. The firm has an agreement with SOM, the architectural firm behind Dubai's soaring Burj Khalifa, to embed its gravity-based storage system into future skyscrapers in order to reduce their carbon footprints.

Old-fashioned pumped-hydro storage, in which water is shunted between reservoirs at different heights, still makes up most of the world's grid-scale energy-storage capacity. India's Greenko, a big renewable-energy developer, has modernised this gravity-based approach and found an economical way to build lots of it. The firm plans to have 50GWh of storage operational in 2025, with another 50GWh coming within the next few years.

Compressed gas is another approach showing promise. Italy's Energy Dome stores carbon dioxide under pressure in distinctive white domes. When energy is needed, the gas is expanded and passed through a turbine. The firm has a facility in operation in Italy, and plans to start building one in America in 2025. The system developed by Canada's Hydrostor, by contrast, uses air as its working fluid. The firm will start construction at a big facility in Australia in 2025, with an even bigger one planned for California.

In sum, an energy-storage revolution is under way. Lithium batteries will rule for the time being, but many alternatives are following behind, promising cleaner and more reliable energy in the future. ●

The real limits on artificial intelligence

LOS ANGELES

Get ready for superchips, supercomputers—and supersized headaches

Henry Tricks US technology editor, *The Economist*

FIFTEEN YEARS after his death, David Blackwell's name will be on every tech nerd's lips in 2025. Nvidia, a semiconductor giant, has named its latest superchip after the mathematician and game theorist, who was the first African-American inducted into the National Academy of Sciences.

The Blackwell chip's debut, with full-scale production starting in early 2025, has provoked breathless anticipation. It will form the backbone of the first data centres purpose-built for the era of generative artificial intelligence (AI). Nvidia's boss, Jensen Huang, calls them "AI factories". But it will also draw attention to the bottlenecks—from the making of chips to the construction of data centres—created by demand for AI-related computational power.

Blackwell is a graphics processing unit (GPU), the kind of AI workhorse chip that has turned Nvidia into a \$3trn giant. The superchip is integral to a new Nvidia platform that will prompt some of the biggest AI firms, including the cloud-service "hyperscalers"—Amazon, Microsoft and Google—to build new server farms for generative-AI computation on a huge scale, with unprecedented energy requirements.

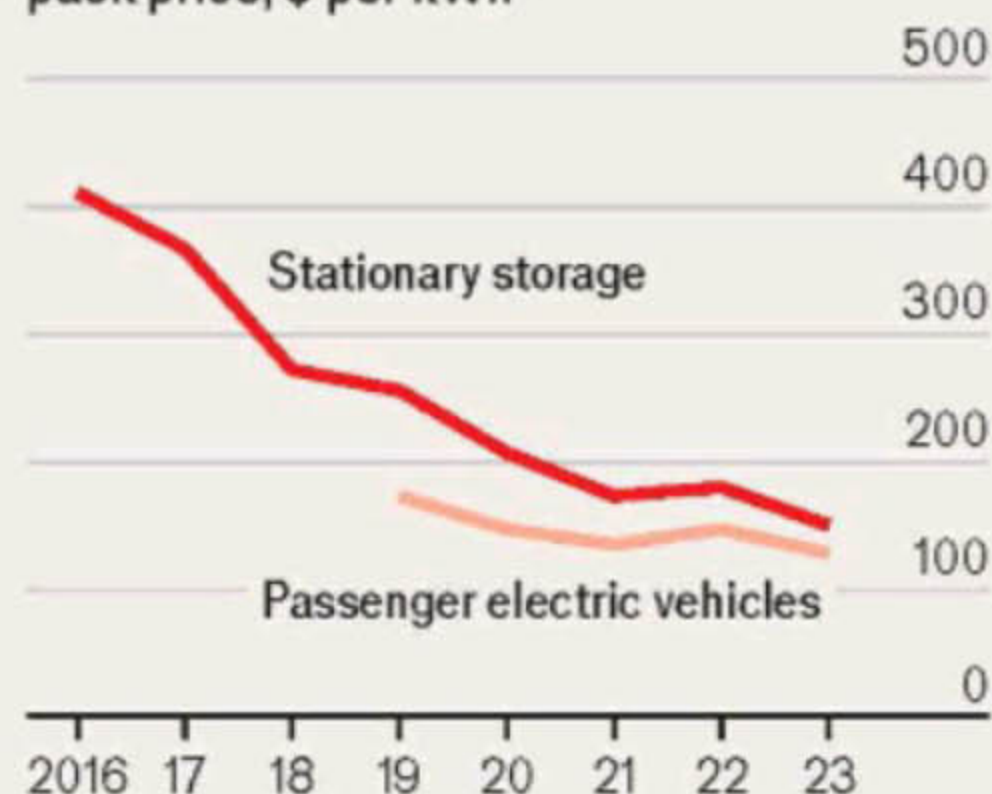
Demand is booming. Baron Fung of Dell'Oro, a research firm, estimates that sales of servers for generative-AI tasks will rise by more than three-quarters in 2025 compared with 2024, reaching \$147bn, mostly thanks to hyperscalers' spending on Blackwell GPUs. As a result, energy demand is also surging. Lucas Beran, also of Dell'Oro, says data centres used to have power requirements of 100-200 megawatts (MW), but big ones now require 300-500MW.

The International Energy Agency (IEA), a forecaster, estimates that over the next two years, global power consumption from data centres could more than double from its 2022 level, reaching 1,000 terawatt hours by 2026—equivalent to the electricity consumption of Japan. Expanding the grid is hard. Ensuring that electricity is carbon-free is harder still. There are plans to restart a nuclear power station at Three Mile Island in Pennsylvania to power several Microsoft data centres, and Google has ordered nuclear reactors from Kairos Power, a startup.

Whether you call them AI factories, data centres or server farms, these new facilities will be giant supercomputers. Elon Musk's so-called "gigafactory of compute" in Memphis is expected to boast 200,000 GPUs. But the energy and chips are not the only real-world constraints on AI.

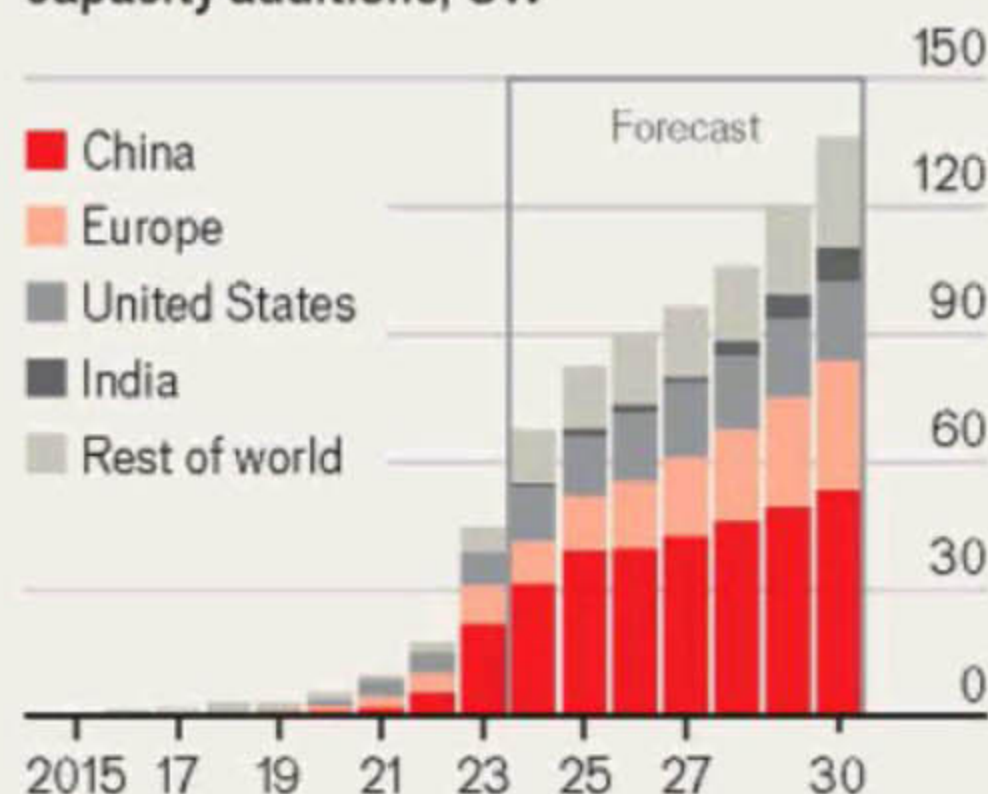
→ All charged up

Average lithium-ion battery pack price, \$ per kWh*

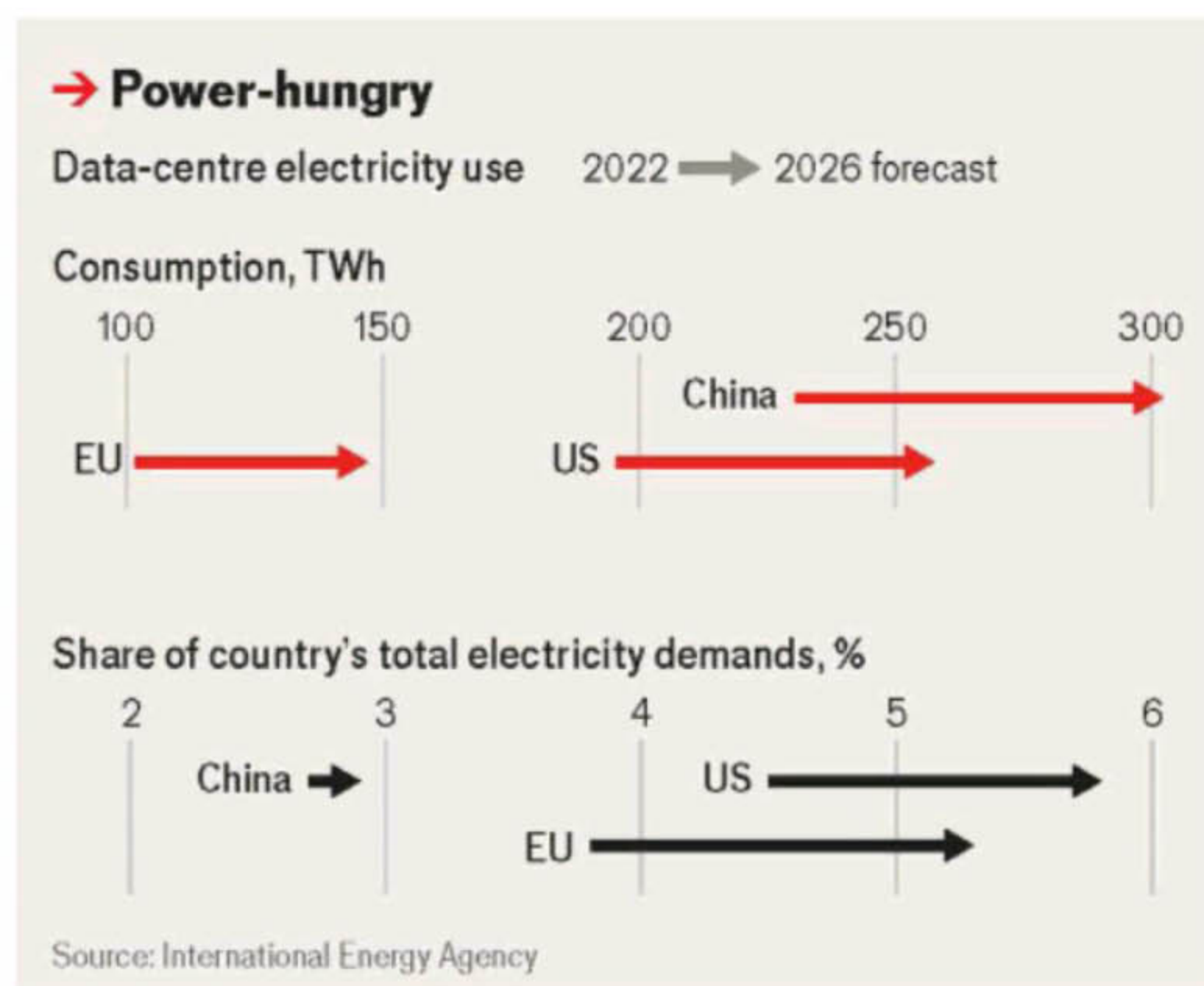


Source: BloombergNEF

Worldwide gross energy-storage capacity additions, GW



*2023 prices



Blackwell's debut has provoked breathless anticipation

consultancy, says that if demand for the GPUs remains strong, there could be shortages of high-bandwidth memory and advanced packaging.

At the local level, environmental groups in Memphis are already protesting that the power consumption of Mr Musk's AI factory will disadvantage local people. At the global level, the IEA says some countries, such as the Netherlands, have put curbs on data-centre construction because of grid constraints. Some tech firms will seek to ease pressure on the grid by erecting on-site generators, but these are often fired by natural gas.

The new data centres need energy not just to power their AI servers, but also to keep them cool. Systems built around Blackwell GPUs will rely on closed-loop liquid cooling—a technique for which demand is expected to surge in the coming year. Such changes will require more than just a retrofit.

Some countries will find it easier to build generative-AI infrastructure. China's central-planning system facilitates bringing together server farms, power plants and workers. But it is cut off from Nvidia's fanciest GPUs because of American trade restrictions. Neither East nor West will find building the next wave of generative AI easy. ●

▶ The pressure to build bigger and better generative-AI models may also create strains along the semiconductor supply chain. Nvidia has already encountered engineering snags in the production of its Blackwell chips by TSMC, a Taiwanese firm, which delayed the launch. David Crawford of Bain, a

Home-made chips

Expect more export bans, a supply glut and creative sanctions-dodging

Shailesh Chitnis Global business correspondent, *The Economist*

ADVANCED CHIPMAKING will return to America in 2025, more than a decade after the country lost its edge in semiconductor manufacturing to Taiwan. Ironically it is TSMC, a Taiwanese chip giant, that will lead this comeback by making state-of-the-art chips at its new fabrication plant (or "fab") in Arizona in the coming year. The American government hopes that chipmakers will produce almost a fifth of all leading-edge chips domestically by 2030.

Reviving advanced chip production is one part of America's strategy; the other is keeping China's chipmaking ambitions in check. Since 2022 America has banned the export of the whizziest chips and chipmaking tools to China. In response, China has invested heavily in its local industry. With Donald Trump expected to take a harder stance with China, the chip wars will intensify in the coming year.

So far, restrictions mainly target

specialist, high-performance chips that are used to run artificial-intelligence (AI) applications. In 2025 America will add some high-bandwidth memory (HBM) chips to the naughty list. Chinese chipmakers, already barred from using the latest manufacturing tools, will find it even harder to produce powerful AI chips without access to HBMs.

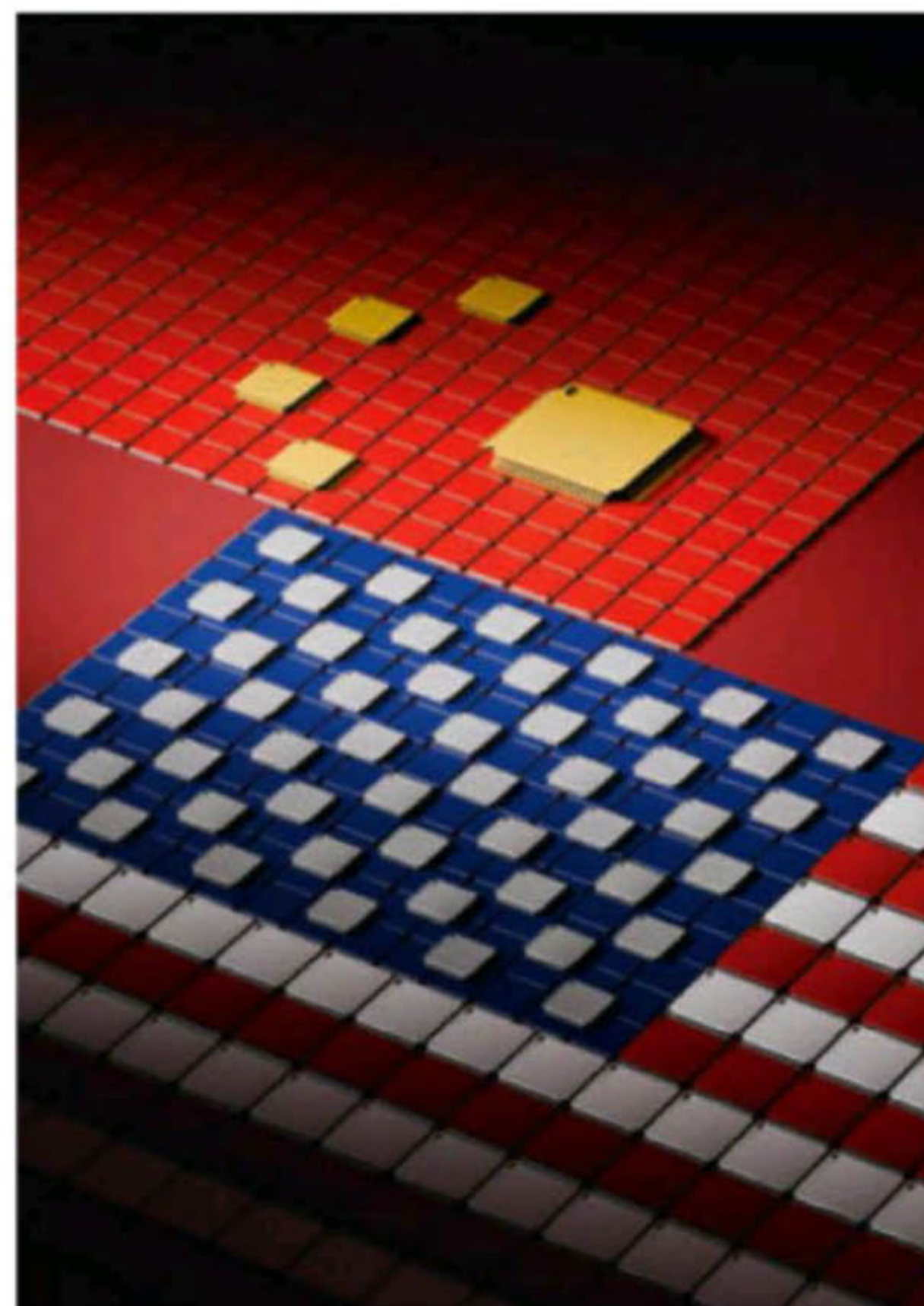
China will tighten its grip on the production of less flashy but equally essential chips. For a few years Chinese firms have been expanding their capacity for "mature-node" semiconductors. These unglamorous, lagging-edge chips may not

grab the headlines, but they power everything from televisions to fridges, and account for over three-quarters of global semiconductor manufacturing capacity.

Bernstein, a broker, estimates that in 2024 China imported \$40bn-worth of chipmaking equipment, nearly two-fifths of worldwide sales. Investment will continue in 2025, with most of the imported gear going into mature-node fabs that use older technology, making chips of 28nm (billionths of a metre) and above. By late 2025, as these fabs ramp up, this will lead to a flood of cheap chips. Western semiconductor firms that specialise in lagging-edge chips will feel the impact.

America's efforts to block China's access to advanced chip technology will continue to yield mixed results. In 2023 Huawei, a Chinese tech giant, unveiled a smartphone chip built on 7nm technology. The firm is rumoured to be working on a 5nm chip with SMIC, China's largest chipmaking firm. In 2025 Chinese firms will make cutting-edge chips by pushing older tools to their limits, though only a small fraction of the chips produced using such tricks are thought to be usable.

Chinese firms with deep pockets will find ways to gain access to advanced AI chips. But their scarcity will push Chinese researchers to focus on software improvements, devising smaller, more efficient models to eke out more performance from slower chips. No doubt there will also be tariff skirmishes and rule tweaks in the continuing Sino-American tussle. The longer the chip war drags on, the more it will test the loyalty of countries and companies caught in the crossfire. ●



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Going global

SINGAPORE

American tariffs are helping to drive Chinese firms' expansion overseas

Mike Bird Asia business and finance editor, *The Economist*

AMONG WESTERN multinational firms, outsourcing has become a dirty word. Firms that once eagerly moved production abroad (especially to China) in order to reduce costs are keen to show they are committed to their home bases. But now the cheaply manufactured shoe is on the other foot. Chinese firms are the ones shifting their operations abroad, investing in new production facilities across the world. This trend will intensify in 2025.

For Chinese firms wishing to export to America, overseas operations are no longer optional. Moving production out of China has allowed them to avoid American tariffs put in place during Donald Trump's first term, and retained by the Biden administration. With the re-election of Mr Trump, and the prospect of tariffs against Chinese exports of 60% or more, the scramble to find overseas bases is now urgent.

The logic goes beyond the trade war, too. Local production in other countries opens up new markets and insulates Chinese producers against future trade restrictions. It can generate local goodwill—and sometimes government subsidies as well. It also reflects the grim reality of China's economic slump. For decades, the booming domestic market was enough for the country's big firms. Now, faced with a protracted slowdown driven by a slump in the property sector, it is no longer such a promising option.

The shift is visible in "greenfield" foreign direct investment in new sites by Chinese firms, which hit a record \$163bn in 2023 (see chart), concentrated outside



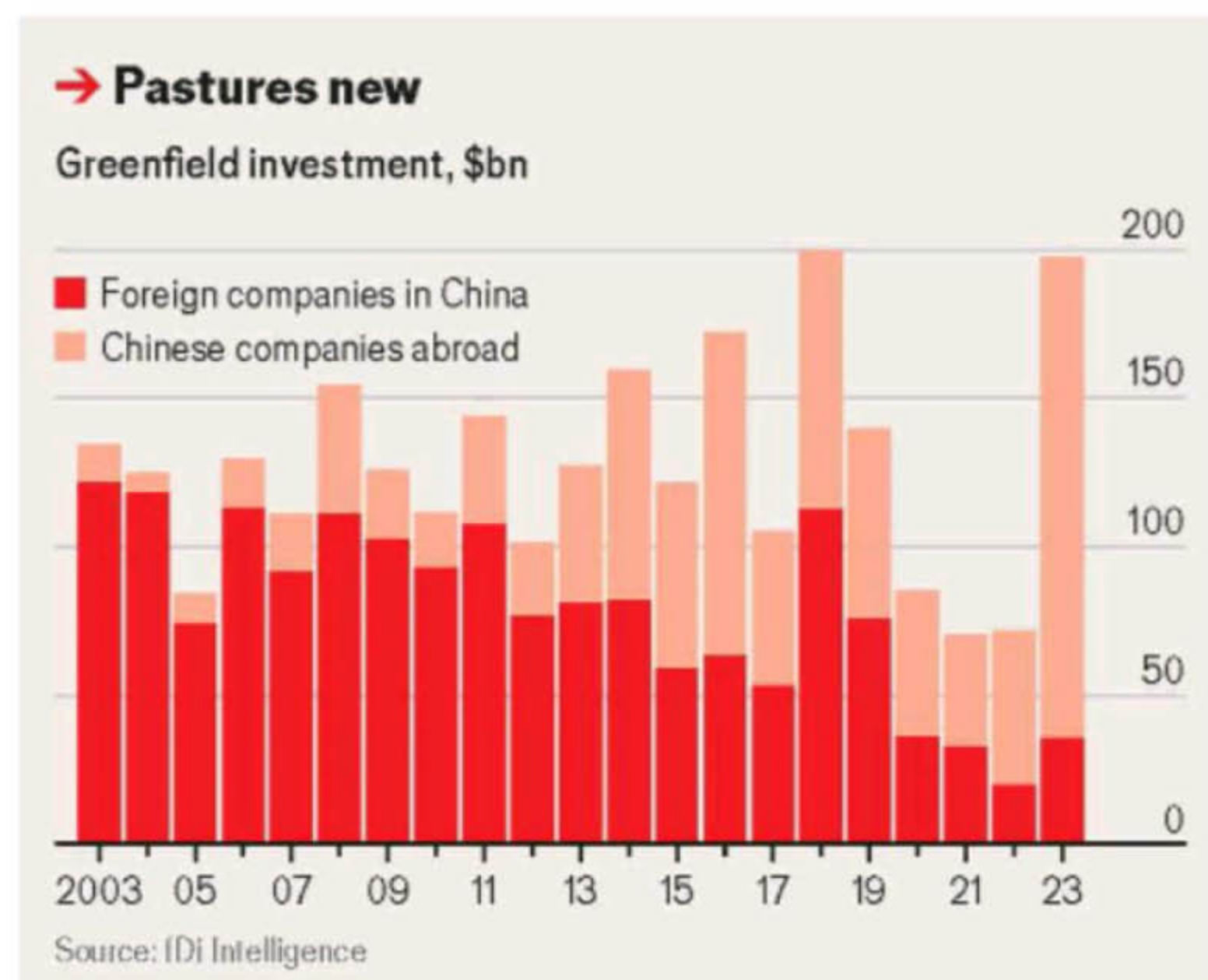
↑ *Coming to a green field near you*

the West. Saudi Arabia, Malaysia, Vietnam, Morocco and Kazakhstan were the five largest destinations. There has been no sign of a slowdown in 2024. BYD, China's leading maker of electric vehicles (EVs), which is already building a factory in Hungary, announced a \$1bn investment in Turkey in July. Great Wall Motor opened a car factory in January 2024 in Thailand, where Chang'an Automobile's factory is also due to open in March 2025. Beiqi Foton Motor, a truckmaker, is preparing to spend \$1bn on an EV factory in Mexico. Overall outbound investment by Chinese companies in the first nine months of 2024 was \$124bn, a 9.2% increase on the same period in 2023.

Listed Chinese companies are still homebodies. They make just 10% of their revenue abroad, compared with 35% for Japanese firms. But some pioneers make more: Goertek and Luxshare, two electronics firms in Apple's supply chain, have expanded in South-East Asia in recent years, and now make 93% and 89% of their revenues overseas respectively.

Such moves offer huge opportunities. Done well, expanding abroad can be an antidote to trade tensions. Chinese firms, and carmakers in particular, are following in Japanese footsteps. Trade tensions between Washington and Tokyo, which peaked in the 1980s, were soothed by massive investment by firms like Honda, Nissan and Toyota in American production sites. Chinese carmakers may never crack the American market. But expansion abroad will help soothe trade tensions with other countries.

Yet the shift comes with risks, too, as Chinese solar-panel manufacturers operating overseas have found. America's Department of Commerce says that their production sites in South-East Asia are used for little more than the final assembly of Chinese goods, and placed new tariffs on the firms' production there in June 2024. As Chinese firms shift overseas in increasing numbers to escape the coming wall of tariffs, they may find that the long arm of American protectionism still reaches them nonetheless. ●



BYD announced a \$1bn investment in Turkey

East meets West

China's e-commerce upstarts will start to look more like Western ones

Guy Scriven Global business correspondent, *The Economist*

IT DID NOT take long for Chinese e-commerce firms to spread worldwide. Shein has rapidly become the preferred choice of American teenagers buying clothes. In 2023 TikTok launched its own e-commerce offering to its 1bn-plus users. And for most of 2024 Temu was America's most downloaded app. But this rapid rise also attracted the scrutiny of policymakers. In 2025 this will force changes upon the upstarts that will make them more like their Western rivals.

One factor behind their rise has been a marketing blitz. Shein and Temu flooded social media with eye-catching promotions. Another is dirt-cheap prices, possible partly because Chinese firms

charge merchants less than American ones do, and also because they ship goods straight from Chinese warehouses to the destination country. From there, delivery firms, such as UPS and FedEx, take the packages to the shopper's door. The lack of an Amazon-like logistics network keeps prices low, but also means that shipments can take weeks to arrive.

Now things are changing. First, higher prices. The cost of air freight shot up in 2024, as more packages were sent from China. And taxes may start to be applied. Chinese goods are so cheap because import rules often allow small packages to be sent tax-free to Western countries. In 2015, 134m such packages entered America tax-free. In 2023 that figure reached 1.1bn, 60% of which came from China. The growth has rankled policymakers in America, Britain and the EU, who are trying to close the loophole.

A second change will be in the types of goods that they stock. Temu is trying to add European and American brands. Both Shein and Temu have been buying warehouse space in America, allowing them to sell bulkier items. To protect itself from rising shipping costs, Temu is also handing responsibility for logistics and delivery to Chinese merchants who have warehouses in America.

A third shift is that Chinese firms will have to deal with environmental, social and

governance (ESG) issues. European policymakers worry about the environmental impact of cheap, disposable clothes. In America, Congress has probed Temu and Shein for the possible use of forced labour in their supply chains.

Shein is doing the most to respond to such concerns, partly because it plans to list on the London Stock Exchange. To boost its sustainability credentials it has launched a €200m (\$223m) fund to invest in "circularity" (jargon for recycling and reusing goods), and rolled out a second-hand marketplace.

But as they face growing pressure, the companies may also shift focus to places outside America, where there is less scrutiny. All three have been expanding in the Middle East and Latin America. TikTok's purchase of a majority stake in Tokopedia, an Indonesian e-commerce company, will help it make further inroads into South-East Asia. Bernstein, a broker, expects the value of all the goods sold on Temu to grow from \$53bn in 2024 to \$96bn in 2026, but the share bought by Americans to shrink from a third to a quarter.

China's e-commerce firms have long tried to downplay their Chinese roots in an attempt to persuade Western policymakers that they are not a threat. None of that may be enough to shield them from major shake-ups in 2025. ●

Xi's electric

To see the cars of the future, look at China's EVs

Simon Wright Industry editor, *The Economist*

THE MAIN appeal of a Chinese electric vehicle (EV) to foreign buyers is obvious: high quality at prices Western carmakers cannot match (even allowing for import tariffs on Chinese vehicles). But Chinese EVs do not just offer lower prices. They also have more impressive features. The styling and technology in their 2025 models show where cars, as a whole, may be heading.

Some vehicles made by BYD, for example, offer rotat-

ing touchscreens in the centre of the dashboard, which can swivel themselves between landscape and portrait modes. Its Atto-3, a quirky mid-size EV, has unusual guitar-like strings on its door panels, and a gear-selector seemingly inspired by a rocket ship. The upmarket Yangwang U8 SUV, meanwhile, can "tank turn" on the spot by spinning its wheels in different directions, and has a "floating" mode that lets it drive on water in emergencies.

If that sounds a bit much, marvel instead at the minimalist cabin of the Jiyue 01, a collaboration between Baidu, a Chinese tech giant, and Geely Auto. Aside from a touchscreen, its only controls are two pedals (brake and accelerator) and two buttons, located on the steering yoke. Its autonomous-driving system copes admirably with Beijing's crowded streets and unpredictable traffic. But the \$30,000 car also doubles as a giant video-

game system. Pull over, and you can use the steering yoke to control a virtual car in an on-screen game.

The SU7 Max, a new EV from Xiaomi, best known as a maker of smartphones and home appliances, accelerates like a supercar (0-60mph in 2.8 seconds) and has a battery range of 800km (497 miles). It also allows for remote control,

while on the road, of Xiaomi devices in the driver's home.

Chinese new-car buyers, whose average age is around 35 (some 20 years younger than in Europe), are tech-savvy and expect vehicles to be loaded with whizzy features. Chinese firms are giving them what they want. Western carmakers may not be able to catch up.



↑ He's done things you never expected

Present new arms

Conflict is driving investment in European defence firms, old and new

Kenneth Cukier Deputy executive editor, *The Economist*

IF THERE IS one iconic image from the Ukraine war, it may be that of a small drone destroying a Russian tank. Examples of such destruction abound on social media. The asymmetry of cost and damage typifies modern warfare. It is also spurring a major retooling of armed forces. In 2025 Europe's traditional defence businesses will bump up against the innovation ecosystem of entrepreneurial startups.

The idea of "defence-tech" is coming of age, thanks to new technologies such as drones and artificial intelligence (AI). America led the way, with firms like Palantir, which provides data analytics to governments and companies, and Anduril, which sells drones and autonomous submarines. Both recently won big Pentagon contracts. That offers encouragement to European defence startups vying for contracts, like Helsing, which develops drones and AI software, Finland's ICEYE, a microsatellite-maker, and Delian Alliance Industries, which sells autonomous surveillance systems.

More than €2bn (\$2.2bn) in venture investment has gone to around 300 defence-related startups in each of the past three years, according to Dealroom, a data provider. Government funding will add to that in 2025. NATO's Innovation Fund has a war-chest of €1bn. The European Defence Industry Programme boasts €1.5bn.

Those sums are small compared with Europe's annual defence budget of around €340bn, but more money is coming. Despite an increase in spending since the war in Ukraine began, eight countries will fail to reach the NATO target of spending 2% or more of GDP a year on defence. Reaching that target—something Donald Trump will strongly encourage—would add a further \$45bn a year. New rules are being considered to let the European Investment Bank lend more to the sector.

Yet Europe's defence market is fragmented: there are, in effect, 27 Pentagons (one for each member of the European Union). Governments privilege local firms and existing suppliers. It is hard for new entrants to break in, even if there is

a need for smaller, innovative systems.

Adding momentum for defence-tech firms in 2025 is a landmark report on European competitiveness released in September by Mario Draghi, a Eurocrat grandee, that called for supporting the sector. Some 48% of European defence spending goes to non-EU suppliers, with 34% going to America. Moreover, just 18% of spending involves collaboration between countries. The Draghi report calls for a radical overhaul in everything from defence funding and procurement to cross-border co-operation.

Trying to make this happen will be the task of the EU's first-ever commissioner for defence. Andrius Kubilius, a former prime minister of Lithuania, was nominated in September. He is charged with supporting European industry, not just its security. He endorses the controversial idea of having the EU issue "defence bonds" to pay for the new funding, which is supported by France and Estonia, but opposed by Germany.

Josh Wolfe of Lux Capital, a defence-tech investor, expects an emphasis in 2025 on "maintenance-tech"—innovation to extend the life of older systems. After all, the new commander of the British Army recently announced the goal of doubling the forces' lethality by 2027 without more spending. Many expect a wave of tie-ups between incumbents and startups in 2025.

More pessimistic observers fear that not much will change, however, despite the need, attention and funds. A bias towards the status quo runs deep, they say. As a result, the flood of new funding could actually entrench the incumbents, making life even harder for defence-tech startups. The fight to transform warfare is not just taking place on the battlefield. ●



Not yet cleared for take-off

Boeing will hope that 2025 is better than 2024

Simon Wright Industry editor, *The Economist*

LITTLE HAS gone right for Boeing in 2024. The year started with a mid-flight blowout of a panel from the fuselage of a 737 MAX passenger jet. There were no serious injuries, except those added to Boeing's reputation, just as it seemed to be recovering from two fatal crashes involving the same model of aircraft six years ago. The firm's competence was put in question again in September when malfunctioning software meant that Starliner, a capsule designed to ferry astronauts to the International Space Station, was forced to return to Earth empty. That left two spacefarers stranded in orbit awaiting a lift home in a craft from SpaceX, Boeing's biggest rocketry rival. Then a strike by 33,000 workers halted production of most planes for nearly eight weeks.

A company that was once a byword for engineering prowess has lost its way, seeming to put financial returns before technical excellence after a merger with McDonnell Douglas in 1997. Between 2014 and 2020 Boeing handed out \$61bn in dividends and share buybacks. But now its finances have fallen to Earth, too. Since 2020, when the pandemic severely dented demand for plane travel, Boeing's annual losses have totalled \$23bn.

In March, Dave Calhoun, Boeing's boss since 2020, accepted responsibility for the company's ills and agreed to stand down. In 2025 all eyes will be on Kelly Ortberg, a seasoned aerospace executive who took over in August. What can he do to restore Boeing to its former heights?

The most important job for Mr Ortberg, an outsider in a firm that prefers to appoint leaders from within, is to restore Boeing's culture of engineering excellence and improve quality control. But breaking a company's culture is much easier than remaking it. Mr Ortberg needs to take his time to understand a complex organisation employing 145,000 people worldwide before making substantial changes. Rumour has it that he wants to relocate Boeing's headquarters from Virginia back to Seattle; that would be a sensible way to put bosses closer to operations. ►►

Other tasks require more urgent attention. Despite its travails, the Boeing 737 MAX is a good plane with a huge backlog of orders. Boeing's waiting list, however, is not as long as that of Airbus, its European competitor in the duopoly that supplies large passenger jets.

Calls to launch an entirely new plane should be resisted as unaffordable and unnecessary. More important is restoring relations with regulators, who have capped production of the 737 MAX at 38 a month until Boeing can convince them that the safety lapses that led to the panel blowout have been dealt with.

Delivering more planes would also assuage the anger of customers, clamouring for new fuel-efficient jets. Bulging order books mean there are no free delivery slots for new planes at Airbus for many years. Customers have little choice but to stick with Boeing. But late deliveries will give airlines leverage to seek even bigger discounts.

Starliner's troubles highlight problems at other parts of the company, where competition is also heating up. While Boeing has struggled with huge cost overruns in its space division, Elon Musk's SpaceX has gone from strength to strength. Defence, usually a reliable bulwark against the cyclical nature of commercial aerospace, has floundered, even as defence spending around the world is at a multi-decade high. Overambition in fulfilling fixed-price contracts has led to losses, and Boeing has had less success in bidding for lucrative new programmes.

Mr Ortberg's to-do list is lengthy and onerous. Fixing Boeing is a job that will take years rather than months. But having fallen so low, the only way is up. ●



↑ Grounded



Never say DEI

Diversity programmes will not die in 2025, but they will be slimmed down

Sacha Nauta Social affairs editor,
The Economist

IF 2020 WAS the year when diversity, equity and inclusion (DEI) schemes ballooned and bosses declared their undying commitment, then 2024 marked the start of the anti-woke backlash. This pummelling will continue in 2025 and spread. Yet DEI will not die, but will instead undergo a makeover before returning in a more modest form.

Looking back at the sharp rise in the corporate world's commitment to DEI in 2020, in the aftermath of George Floyd's murder, it is tempting to expect the fall to be just as steep. There are signs of this. Mentions of DEI in earnings calls have fallen sharply. After rising 14-fold between early 2020 and mid-2021, by mid-2024 they were only three times higher than before Floyd's killing. In 2025 such scrubbing of overt references will continue.

According to Gallup, a pollster, just 38% of Americans now want businesses to take a stance on current events, down ten points since 2022. Divisive and ideological interventions are turning employees against DEI, too. In 2019, 77% of companies said racial diversity was a high priority. That had dropped to 69% by 2024.

Bosses and shareholders fear few things more than the wrath of online influencers, particularly those spurred on by Elon Musk, who states that "DEI must die." Tractor Supply, a huge farm-supplies firm based in Tennessee, responded to complaints in June by promising to "retire current DEI goals while still ensuring a respectful environment". More such responses in the face of bad PR will follow in 2025, particularly from firms with conservative customers. The re-election of Donald Trump will give them both motivation and political cover.

But most companies will respond less dramatically. They will tone down their rhetoric and gradually phase out some schemes. Job postings or internships aimed at only one particular group will be challenged by lawyers. Executive-compensation schemes that tie bonuses to diversity targets will be phased out.

Yet smart employers will recognise that most workers are broadly in favour of promoting genuine diversity and inclusion, and will retain the good elements. Efforts to ensure that recruitment draws from a bigger and broader talent pool will continue, along with fairer, more systematic ways to evaluate candidates, such as blanking out names on CVs and asking every interviewee the same questions.

Nearly three-quarters of workers believe workplaces have become more respectful and inclusive over the past decade, according to Lean In, an NGO, and McKinsey, a consultancy. The aim of making workplaces fairer and genuinely more inclusive will not die in 2025. But the DEI acronym might be beyond saving. As "chief diversity officers", driven to correct the world's injustices, are replaced by HR types with more modest, less divisive goals, DEI may re-emerge as something closer to its original purpose. ●

By Invitation

Understanding how the world works is the next step for AI

LANGUAGE IS FULL of visual Laphorisms. Seeing is believing. A picture is worth a thousand words. Out of sight, out of mind. The list goes on. This is because we humans draw so much meaning from our vision. But seeing was not always possible. Until about 540m years ago, all organisms lived below the surface of the water and none of them could see. Only with the emergence of trilobites could animals, for the first time, perceive the abundance of sunlight around them. What ensued was remarkable. Over the next 10m-15m years, the ability to see ushered in a period known as the Cambrian explosion, in which the ancestors of most modern animals appeared.

Today we are experiencing a modern-day Cambrian explosion in artificial intelligence (AI). It seems as though a new, mind-boggling tool becomes available every week. Initially, the generative-AI revolution was driven by large language models like ChatGPT, which imitate humans' verbal intelligence. But I believe an intelligence based on vision—what I call spatial intelligence—is more fundamental. Language is important but, as humans, much of our ability to understand and interact with the world is based on what we see.

A subfield of AI known as computer vision has long sought to teach computers to have the same or better spatial intelligence as humans. The field has progressed rapidly over the past 15 years. And, guided by the core belief that AI needs to advance with human benefit at its centre, I have dedicated my career to it.

No one teaches a child how to see. Children make sense of the world through experiences and examples. Their eyes are like biological cameras, taking a "picture" five times a second.

Look beyond language models, says Fei-Fei Li, co-director of Stanford HAI, CEO of World Labs and "godmother of AI"



By the age of three, kids have seen hundreds of millions of such pictures.

We know from decades of research that a fundamental element of vision is object recognition, so we began by teaching computers this ability. It was not easy. There are infinite ways to render the three-dimensional (3D) shape of a cat, say, into a two-dimensional (2D) image, depending on viewing angle, posture, background and more. For a computer to identify a cat in a picture it needs to have a lot of information, like a child does.

We need to move from large language models to large world models

This was not possible until three elements converged in the mid-2000s. At that point algorithms known as convolutional neural networks, which had existed for decades, met the power of modern-day graphics processing units (GPUs) and the availability of "big data"—billions of images from the internet, digital cameras and so forth.

My lab contributed the "big data" element to this convergence. In 2007, in a project called ImageNet, we created a database of 15m labelled images across 22,000 object categories. Then we and other researchers trained neural-network models using images and their corresponding textual labels, so that the models learned to describe a previously unseen photo using

a simple sentence. Unexpectedly rapid progress in these image-recognition systems, created using the ImageNet database, helped spark the modern AI boom.

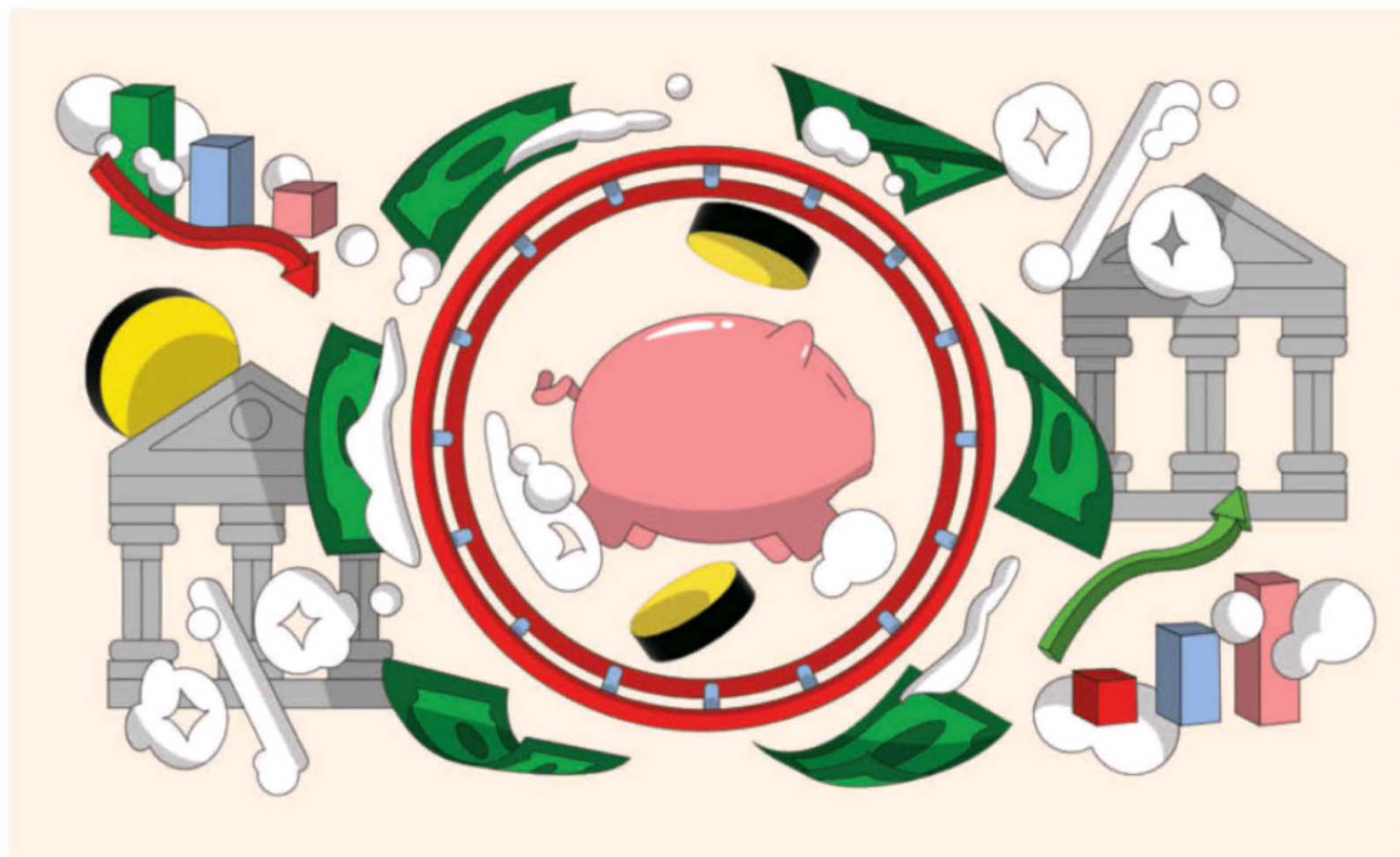
As technology progressed, a new generation of models, based on techniques such as transformer architectures and diffusion, brought with them the dawn of generative AI tools. In the realm of language, this made possible chatbots like ChatGPT. When it comes to vision, modern systems do not merely recognise but can also generate images and videos in response to text prompts. The results are impressive, but still only in 2D.

For computers to have the spatial intelligence of humans, they need to be able to model the world, reason about things and places, and interact in both time and 3D space. In short, we need to go from large language models to large world models.

We're already seeing glimpses of this in labs across academia and industry. With the latest AI models, trained using text, images, video and spatial data from robotic sensors and actuators, we can control robots using text prompts—asking them to unplug a phone charger or make a simple sandwich, for example. Or, given a 2D image, the model can transform it into an infinite number of plausible 3D spaces for a user to explore.

The applications are endless. Imagine robots that can navigate ordinary homes and look after old people; a tireless set of extra hands for a surgeon; or the uses in simulation, training and education. This is truly human-centred AI, and spatial intelligence is its next frontier. What took hundreds of millions of years to evolve in humans is taking just decades to emerge in computers. And we humans will be the beneficiaries. ●

Finance



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Down to earth

Rich-world interest rates will fall sharply in 2025. Where will they settle?

Archie Hall Britain economics correspondent, *The Economist*

BUMPILY AND with a few shudders, central bankers made the landing in 2024. The grim predictions that only deep recessions could pull sky-high inflation back down to earth proved misplaced. Instead, a sharp increase in interest rates, supply-side improvements and the passage of time did the job well enough. Inflation is at or near 2% across the rich world and, barring trade wars or other shocks, should stay low. The economic news in most rich countries is fairly sunny. Growth varies from strong to mediocre, but at least is not negative. Share prices are still higher than

ever. Unemployment is just above all-time lows.

Job done, then? Well, almost. The economy may be back to normal, but economic policy is not. Interest rates are at their highest level since before the financial crisis of 2007-09. Most central banks—including the Federal Reserve, European Central Bank and Bank of England—started cutting rates only in the summer or autumn of 2024. Bigger drops are coming in 2025. Traders foresee roughly one percentage point of further cuts in America, Britain and the euro area.

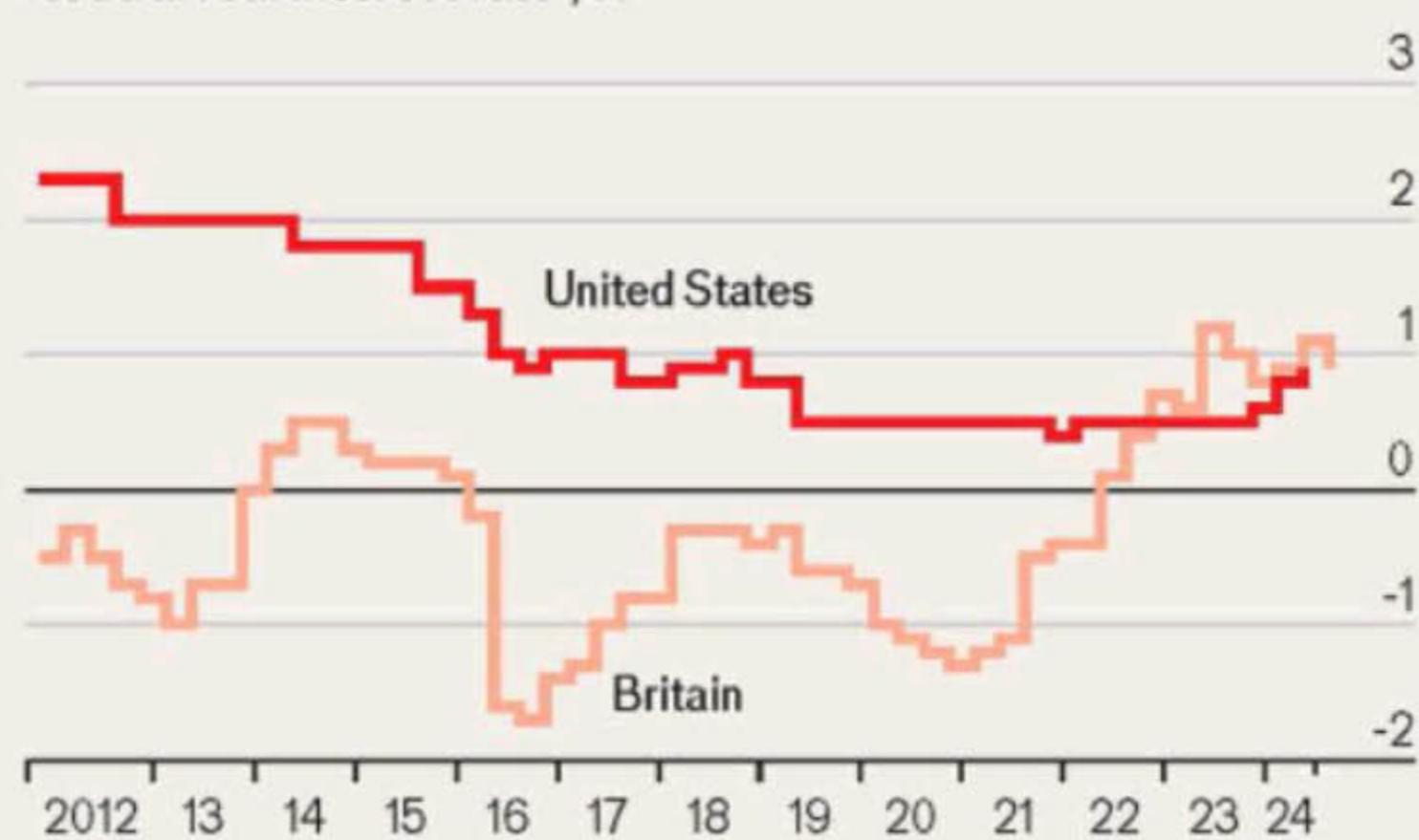
Or look to budget deficits. America's government is now running a deficit of 6.4%, the highest in post-war history, outside covid or the financial crash. Donald Trump will surely widen it further. Many rich-world peers have done a bit better at reining in government spending since the pandemic, though deficits also look worrisome in France and Italy.

Policy will re-normalise in 2025. Monetary policy will move faster and more consistently than fiscal policy. Central bankers tend to be more sober and predictable than politicians. Far less clear, though, is what baseline economic policy will drift back to. The last proper stretch of economic normality was five years ago. As the dust settles, what has changed?

Central bankers tend to express answers to that question in terms of r^* (pronounced r-star), the “neutral real interest rate”. That is the interest rate which, after stripping out inflation, neither stimulates nor depresses the economy. Alas, r^* cannot be observed directly. Economists look instead at how the economy responds to real-life interest-rate moves. If

→ Star chart

Neutral real interest rate*, %



*Forecast medium-term policy rate minus the expected medium-term inflation rate
Sources: Bank of England survey; Federal Reserve

- the structure of the economy has changed since the pandemic, r^* should be different, too.

From the 2000s to the 2010s, r^* fell sharply. In the decade after 2010, even ultra-low interest rates failed to gin up demand. More recently, rich-world economies have shrugged off even quite hefty interest-rate rises. Has r^* risen, and will it stay up? Jerome Powell, the Fed chair, seems to think so, as do many investors and economists (see chart). There are good reasons for this. Geopolitical tension, for instance, may have taken the shine off US Treasuries as a safe haven.

An immediate recession does not look likely

But do not call time on a low-rates world quite yet. In the long run, the single greatest determinant of real interest rates is probably economic growth. Investors can hardly expect high returns amid stagnation. Slow population growth is weighing on workforces. Growth figures were jolted around by the covid-19 pandemic, but most rich countries are either on their pre-pandemic trend or a bit below it. People who expect to live longer are likely to save more, boosting the supply of capital in search of return-generating investments. That also pushes down on r^* .

As interest rates continue their descent during 2025, r^* will help determine where they settle. Other factors could intervene. Rates may need to stay higher for a while to counterbalance bigger fiscal deficits if, for instance, governments raise defence spending to hedge against growing American isolationism. And if the world is now more prone to supply shocks, rate-setters may need to skew tighter to ward off inflation. But think long-term enough and r^* is inescapable.

A lower-than-expected r^* could cause trouble. One reason Americans have been sanguine about the recent wobbles in the labour market is that the Fed still has plenty of room to ease. But if the neutral interest rate is lower, then rate cuts will also have to be deep to push monetary policy into stimulative territory.

None of that should be a concern yet. An immediate recession does not look likely. But the further rates fall, the more likely it is that monetary policy will start feeling like the 2010s all over again. ●

Vitamin boost

Amid softer markets, three commodities will stand out

Matthieu Favas Commodities editor, *The Economist*

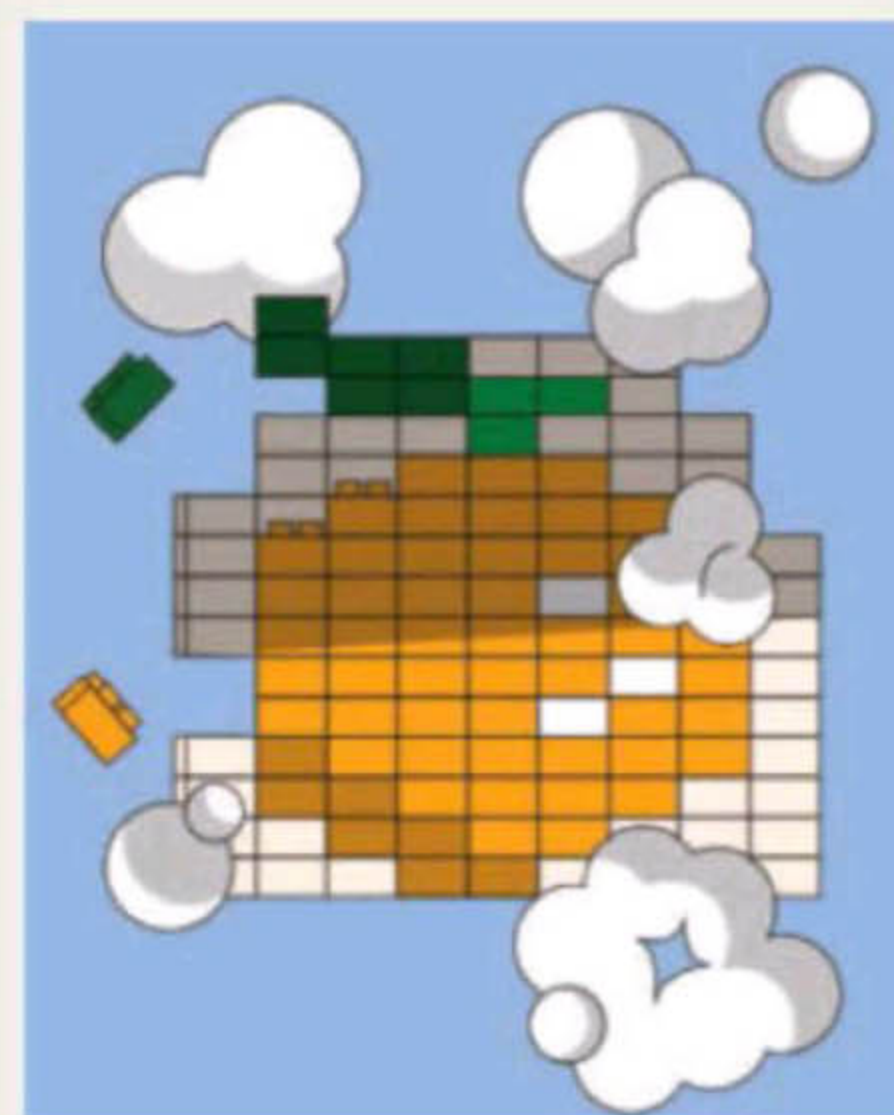
FOR MUCH of 2024 commodity prices were driven by low demand. America slowed down and economic woes worsened in China, the world's biggest importer of raw materials. So prices for everything from coal and cobalt to natural gas are lingering at levels that prevailed before Russia's invasion of Ukraine in 2022. For many commodities, this outlook—depressing for traders but helpful to Western central bankers—will carry through to 2025.

Crude oil could become even cheaper, despite persistent geopolitical tensions, as

producers outside the Gulf continue to increase output. And although it is a critical ingredient in all things needed to speed up the green transition, copper may remain unsteady because of shorter-term worries about China's property sector. For a small group of materials, however, pricing will be driven by supply concerns, as market disruptions keep prices red-hot. Three commodities will stand out.

Brazil accounts for 70% of global production of orange juice. In 2024 São Paulo, the most productive state in its "citrus belt", faced a crippling drought. At the same time citrus greening, an incurable bacterial disease that turns oranges bitter and kills trees, went rampant in the region's groves. The price of orange-juice futures in New York, which soft-drink companies use to hedge against price swings, broke records. It will take years before replacement trees can bear fruit, even as seekers of vitamin C keep on buying orange juice. So expect the big squeeze to continue.

The market for another morning favourite will also be jittery. In 2024 prices for arabica coffee beans hit the highest price in a decade after an unseasonal episode of frost hurt yields in Brazil, producer of 40% of the world's supply. That created more demand for lower-quality robusta beans, which are most often used in instant formulas. Producers of fancier coffee started adding more robusta to their regular blends—but major droughts have also hit Vietnam, the largest grower. Shipping prob-



lems linked to attacks in the Red Sea increased the pressure. Some late rain in growing regions may have helped, but stocks of all beans remain low. In 2025 coffee-drinkers may have to swallow higher prices and blander flavours.

Coffee and oranges are tasty, but hardly vital. Uranium is mildly poisonous, but more essential. Demand for it is expected to increase as nuclear plants, a reliable source of low-carbon power, play a bigger role in the energy mix of China, India and other big economies. But potential for disruption abounds. In August Kazatomprom, which produces one-fifth of the world's mined uranium supply in Kazakhstan, trimmed its output target by 15-19%. Soon afterwards Vladimir Putin hinted that Russia, home to 44% of global uranium-enrichment capacity, might limit exports in response to Western sanctions. Logistical issues and tricky geopolitics could cause a meltdown in the market for the radioactive metal.

Beyond the hype

Don't expect a productivity boost from AI in 2025

Callum Williams Senior economics writer, *The Economist*

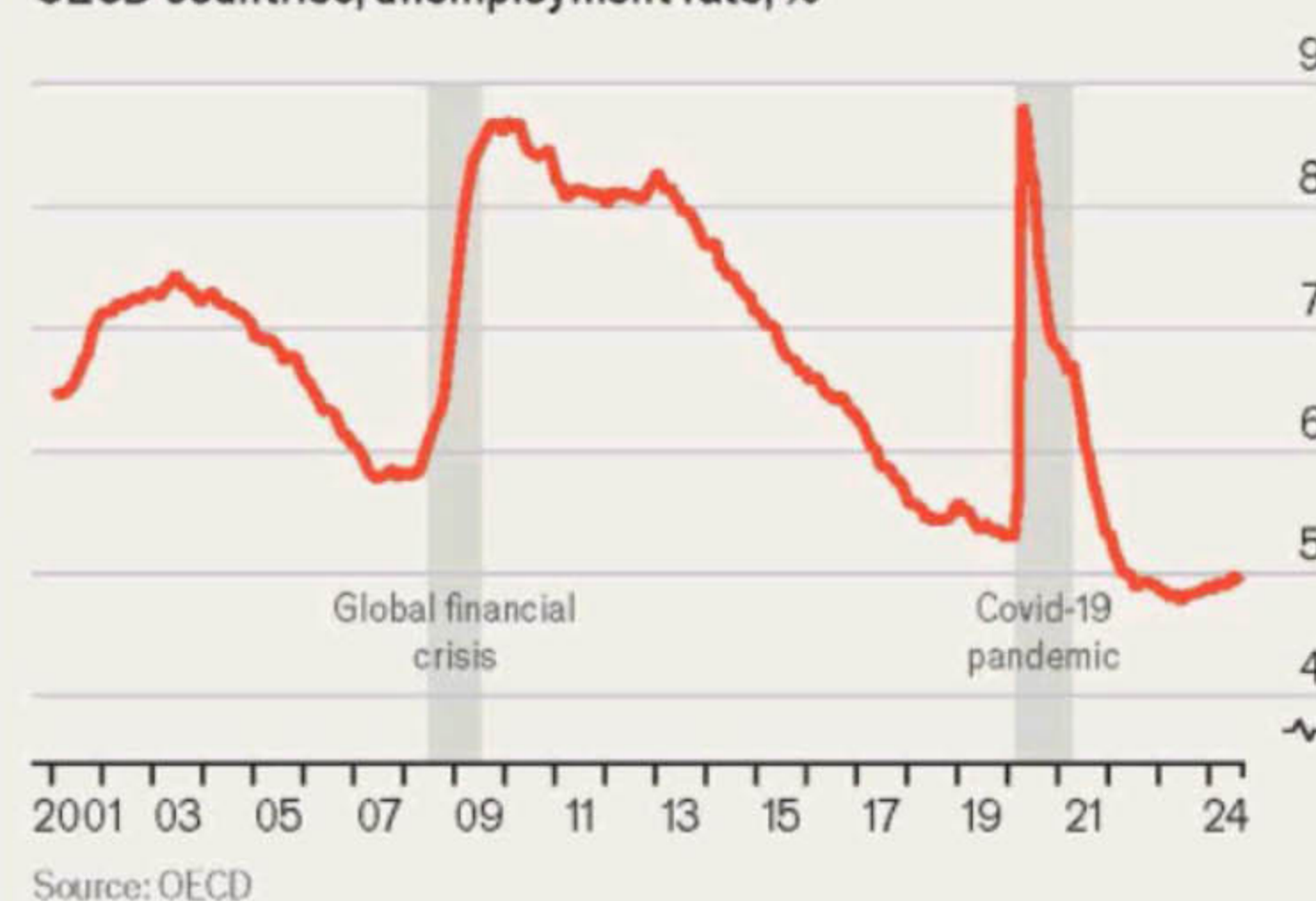
ARTIFICIAL INTELLIGENCE (AI) has already made many people very rich. Anyone who in 2021 bought shares in Nvidia, which makes AI chips, has by now octupled their money. The firm's founder, Jensen Huang, has probably made more than \$100bn from the share-price surge—and he is not the only one in Silicon Valley sitting on gigantic paper profits. And yet so far, AI has had almost no impact on America's economy, with unemployment still very low and productivity growth weak. Expect this puzzle to continue in 2025.

Businesses are typically slow to adopt new technologies. Most bosses do not have the time to keep up with the latest trends, whatever they may claim. Financial executives are cautious creatures, and resist spending large sums on unproved gizmos. Historical examples abound. Firms across the world took decades to adopt electricity. The tractor was

AI has had almost no impact on America's economy

→ Still in demand

OECD countries, unemployment rate, %



invented in the early 20th century, but by 1940 only 23% of American farms had one. It was not until 2010 that two-thirds of American firms had a website.

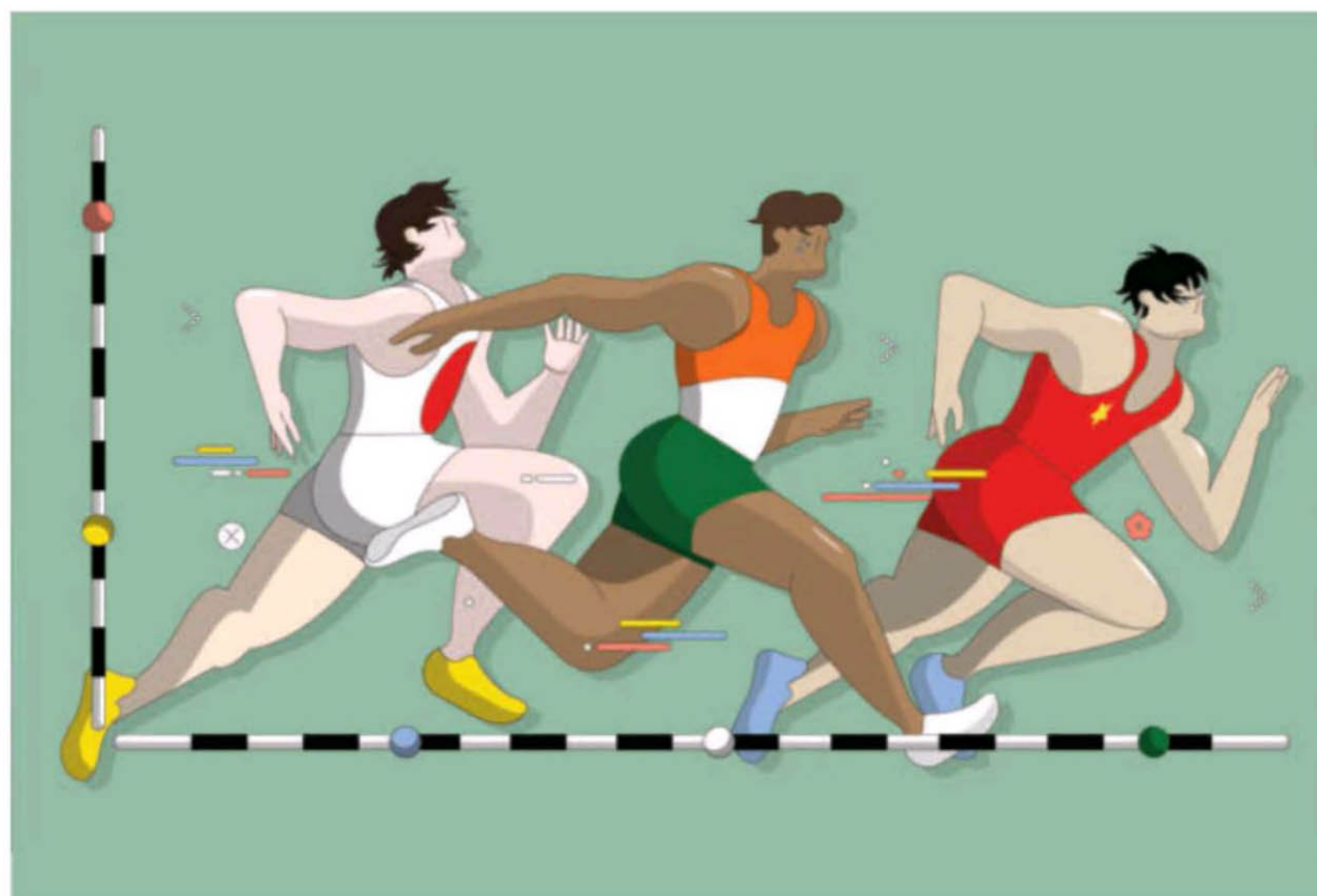
Some argue that the latest wave of AI technology is more significant than electricity and the internet combined, and so it will spread fast. But so far there is little sign of this. America's Census Bureau asks businesses whether they use AI to produce goods and services (ie, for more than just a quick query on ChatGPT). Only 5-6% answer in the affirmative. In Canada, 6% of all firms used AI to produce goods or delivering services in the past year, according to official data. The results for Britain are more impressive, with 20% of firms using AI, though its statisticians ask the question in a different way.

Even in Britain, however, the trends are unimpressive, with the same share having used AI a year ago. Adoption elsewhere has bounced around, with no sign that AI is diffusing across businesses. Small wonder, then, that it is hard to pinpoint any economic impact. GDP growth is decent, but hardly stronger than it was in 2022, the year that OpenAI's GPT-3 was released to the public. Productivity growth remains in the doldrums, far below where it was in the 1960s or 1970s. AI-boosters will tell you that the technology is transforming the fortunes of this company or that. Don't believe them.

The labour market tells the same story. Unemployment across the OECD club of mostly rich countries recently dipped below 5%, its lowest for decades (see chart). The share of working-age people in employment is at an all-time high. There is not much evidence of a surge in people leaving their jobs, which is what you would expect if AI were making people surplus to requirements. Wage growth also remains fairly high. Ask central bankers, and they will tell you that labour demand is currently too high, not too low, as they seek to bring inflation back down to 2% targets. So much for the idea that AI is destroying jobs.

Will an AI wave break over the economy in 2025? Don't bank on it. Only about 7% of American firms, when asked, say that they have plans to adopt AI in the coming months. Capital spending across the rich world remains fairly weak, suggesting that businesses are not investing in the tools that would allow AI to give them a big productivity boost. The question for the coming year is how long this disconnect between the financial markets and the real economy on the usefulness of AI can endure. ●





A new Asian pecking order

As India's economy overtakes Japan's, will it cause an "India shock"?

Simon Cox China economics editor,
The Economist

CHINA OVERTOOK Japan in 2010 to become the world's second largest economy, a title Japan had held for almost 40 years. It went on to become the world's biggest manufacturer, a dominant buyer of commodities and the holder of \$3trn of foreign-exchange reserves. Its penetration of foreign manufacturing markets was dubbed the "China shock" and its buying of safe, foreign assets a "savings glut".

Will the world see such a rise again? India hopes so. In the coming months it is likely to overtake Japan and become the second-biggest economy in Asia and the fourth largest in the world (behind America, China and Germany). India's population is already bigger than China's and its economy is likely to grow two or three percentage points faster in the next few years. India's leaders want its GDP to reach \$5trn by 2028 and exports of goods and services to reach \$1trn apiece by 2030.

India also aims to benefit from the geopolitical tension that China's rise has provoked. Manufacturers scared by Sino-American tension see India as an

alternative. Canals, a market-research firm, says Apple will produce over a fifth of its iPhones in India by the end of 2025.

So will India make as big a splash? The short answer is no, because of the scale and style of its development. In 2010, Japan's economy was still over 8% of world GDP. But its clout has diminished. By the time India overtakes it in a year or two, Japan's share of world GDP will be less than 4%.

India's workforce remains only three-quarters of the size of China's, partly because it includes so few women. Social trends can change. But on some projections, India's labour force will not surpass China's until the 2040s. Even then, India will account for a smaller share of the global workforce than China does today.

That will make it harder for India to become the world's workshop. Even if it meets the government's \$1trn target, its goods exports will be just 3% of the global total in 2030, says Citigroup, a bank. South Korea achieved that share ten years ago.

India's exports of services are more impressive. Its share of the global total could reach 6% by 2030, according to Citi, up from 4.6% in 2023. Multinationals are keeping legal and HR work in-house but moving it offshore, setting up "global capability centres" in India. That will threaten some skilled jobs in the West. But PwC, an accountant, says the centres could employ just 3.4m people by 2028.

An "India shock", then, is not likely. Nor is another savings glut. India's investment needs tend to exceed its own saving rates, so large net capital outflows are unlikely. Indeed, capital will be attracted to India's liquid stockmarkets and the inclusion of its bonds in global indices. India's rise will be less spectacular than China's, and less likely to provoke a backlash. ●

Flotation tanks

Will IPOs make a comeback?

Josh Roberts Capital markets correspondent,
The Economist

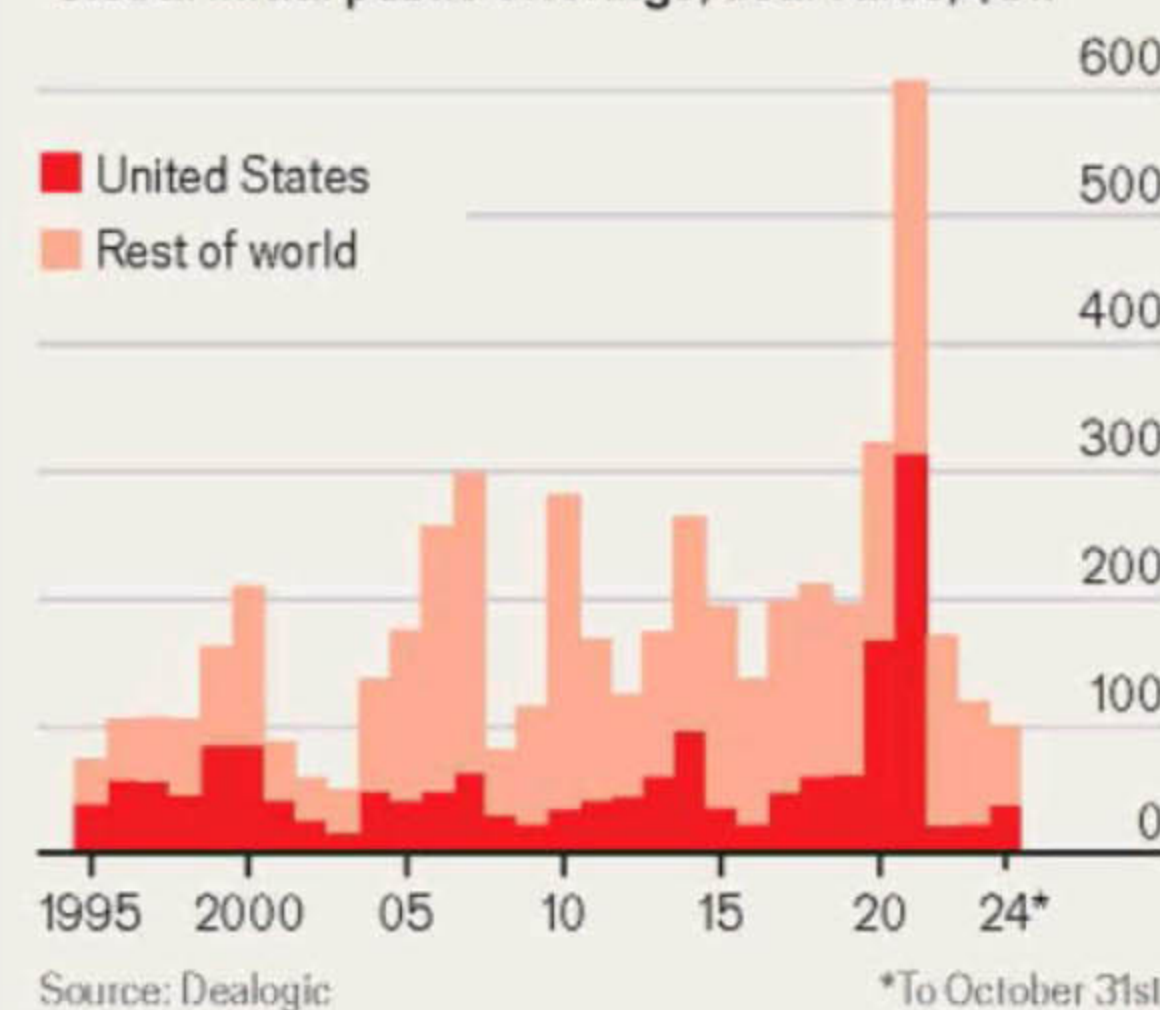
SPEAK TO THE bankers who make their living floating private companies on the public markets and you will sense a frisson of excitement about the coming year. Initial public offerings (IPOs) have been thin on the ground for some time. Now, though, stockmarkets are buoyant and companies are eager to raise new capital.

The bankers obviously can't say which of the rumours are true. But the names that are being thrown around tell you the scale of the coming flood. There is Stripe, a payments giant that in 2021 secured a \$95bn valuation, which then made it America's biggest unlisted company. Perhaps Klarna, a fintech firm that was Europe's largest startup around the same time, will press the button, too. Then there are Chinese superstars, each worth tens or hundreds of billions of dollars: Ant Group, Bytedance, Lalatech, Shein and Xiaohongshu, to name just a few. All will surely float as soon as they get the nod from Beijing.

The trouble is that, changing barely a name or detail, you could have had the same conversation in late 2022, and then again in late 2023. On neither occasion would such optimism have been warranted. The IPO market has been dreary ever since a record-breaking splurge in 2021, when it was awash with liquidity from finance ministers' fiscal stimulus and

→ Sinking feeling

Global initial public offerings, deal value, \$bn



▶ central bankers' monetary largesse. That year, according to Dealogic, a data provider, firms going public raised over \$600bn globally. But that fell to \$170bn in 2022, \$120bn in 2023 and just \$100bn in the first ten months of 2024.

In America, home to the world's mightiest capital markets, the drought is even more marked. Firms listing there raised \$38bn in the first ten months of 2024. Annualised and adjusted for inflation, that makes it leaner than nine of the ten years from 2010 to 2019.

The fortunes of IPO bankers seem unlikely to improve in 2025. If they were going to, then they ought to have done so already. Plenty of stockmarkets are close to all-time highs and—except for a few wild weeks over the summer—volatility has been low to middling. These are supposed to be the ideal conditions for selling newly minted shares at a good price that rewards buyers by holding up (or rocketing) once trading begins. But the bosses of private

The growth of private capital markets, which have fewer rules, gives executives a chance to shun the spotlight

firms, the institutions that invest in them, or both, seem to disagree.

One reason is that interest rates, whose rise sparked the drought, remain a source of risk. Central banks, especially in America and Europe, have begun to loosen monetary policy. But a clouded outlook for inflation and developed countries' vast deficits have kept bond yields jumping around. These determine firms' borrowing costs and the "risk-free" rate of return against which their shares are measured. Uncertainty over the risk-free rate makes IPOs hard to price, and hence sparse.

A second brake on new listings comes from bosses' dislike of the public glare an IPO brings. Many have long thought the disclosure and regulatory requirements for public firms to be too onerous. The rapid recent growth of private capital markets, which have far fewer rules, now gives executives a chance to shun the spotlight. Plenty are eager to seize it.

Most important of all is geopolitics. Wars rage in Europe and the Middle East. Long-feared conflict between China and Taiwan would threaten semiconductor supply chains. Donald Trump's return is more likely to inflame tensions than calm them (and will probably send America's deficit even higher). If you are a global boss, now is not a propitious time to make promises about your firm's long-term performance. Yet that is what those floating on the stockmarket must do; so expect them to remain few in number. ●

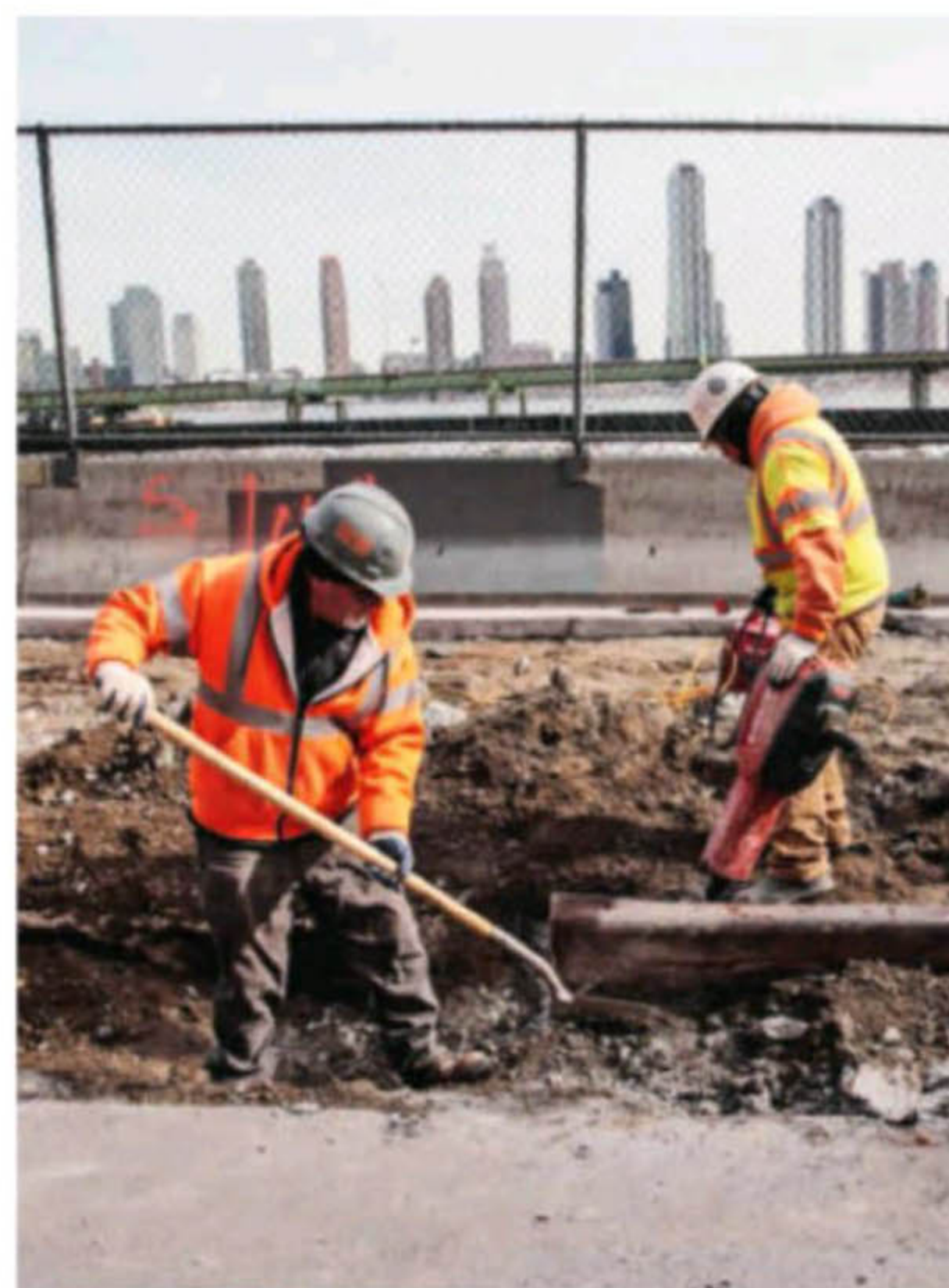
Financial mountaineering

Having hit new highs in 2024, America's stockmarkets could get rocky again

Alice Fulwood Wall Street editor,
The Economist

WHAT A DIFFERENCE a year makes. As *The World Ahead 2024* went to press in November 2023, the S&P 500, the leading index of American equities, was in the doldrums. Share prices were 15% off their peak in early 2022. A chart of the index's performance over the previous two years looked like a mountain range: pushed up and down on inflation worries, undercut by rising interest rates and spooked by fears of a growth slowdown. When pondering what 2024 might bring, your correspondent argued that, after a couple of years of deep uncertainty, investors might finally get enough information about the state of the economy to decide whether to be jubilant or miserable.

And their verdict? They chose jubilation. Since its trough in October 2023 the S&P 500 has climbed by more than 40%. The American economy has powered on, unperturbed by tighter credit conditions. Productivity has continued to surge. In the year to the end of June 2024 output per hour grew by 2.5%, an astonishing pace



↑ Troughs as well as peaks

compared with the average from 2005-19 of just 1.5% and a better showing than even the post-war average of 2.2%. Inflation has all but abated. On a three-month annualised basis, core PCE, the Federal Reserve's preferred gauge of price levels, now stands at just 2.3%, roughly in line with the target. Monetary policy is at last being eased. In September, Fed policy rates were cut, for the first time since 2020, by 0.5 percentage points from their post-financial-crisis peak of 5.25-5.5%.

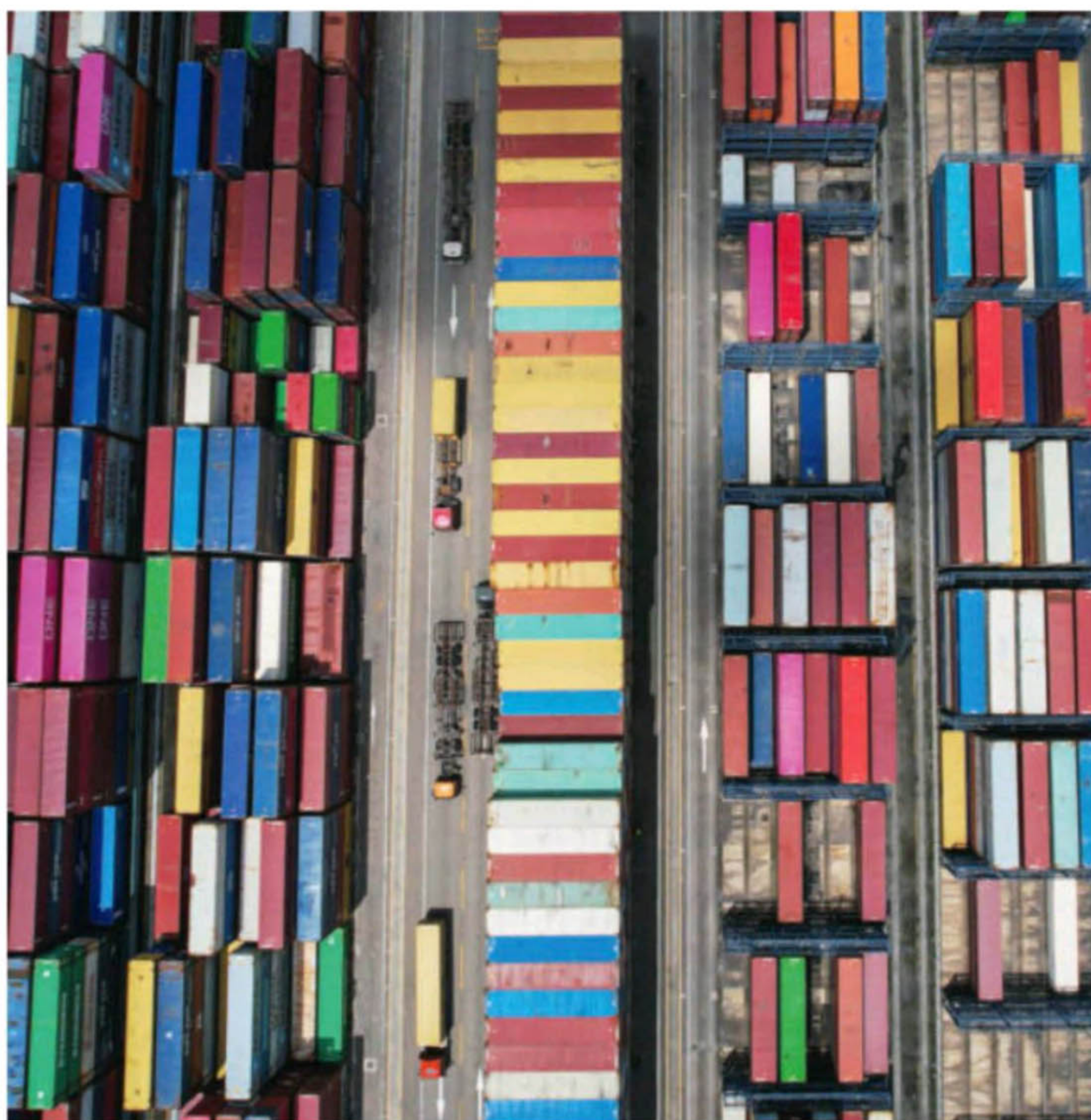
In addition to happy news from the economy, returns have been supercharged by the AI boom. The share prices of the "magnificent seven", a group of leading tech companies, have risen by 90% since the October 2023 lows. Nvidia alone has added \$2.5trn—more than Google is worth—to its market capitalisation. Investors even rejoiced at the re-election of Donald Trump, who promises to cut taxes and deregulate the economy.

Yet after a year defined by growing certainty that all was well, the summer of 2024 has revealed just how anxious investors have once again become. Though the economy still appears to be growing at a remarkable clip, amber warning signs are flashing. The labour market softened. Loan delinquencies, in commercial property and on credit-card balances, have climbed to post-financial-crisis highs.

With the S&P 500 at fresh all-time highs and valuations—the price that investors are having to pay for a firm, relative to its profits—back at cyclically peaky levels, investors are twitchier. Stockmarkets plunged when confronted with weakness in data releases, such as surveys on consumer confidence or manufacturing indexes, that are usually considered mostly unimportant compared with the blockbuster releases of information such as inflation data or job numbers.

Starry-eyed AI optimism also feels more precarious. Confidence about Nvidia's prospects was easier when it was a mere \$1trn company than it is now, as it jostles with Apple to be the world's most valuable firm. Since reaching new highs in July the magnificent seven have been on a stomach-churning up-and-down journey, single-handedly wiping about 10% from the S&P 500 before adding some back (and then losing and regaining ground again).

In 2024 investors got what they wanted: a strong economy, disinflation and easier monetary policy. That heady mix was coupled with truly remarkable technological progress. Investors rejoiced in this mix by escaping the jagged mountain range and heading straight for a new peak. But given changeable economic data, stretched valuations and the risk that Mr Trump brings chaos on trade, it is hard to believe 2025 will deliver such a fortunate mix. Back to the mountain range, then. ●



The trade war spreads

It is pulling in countries that had previously managed to sit it out

Mike Bird Asia business and finance editor, *The Economist*

THE TRADE war which began with tit-for-tat tariffs between Washington and Beijing in 2018 has now been raging for nearly seven years. With the re-election of Donald Trump in America, it will intensify in 2025. But the trade war is also spreading geographically. The number of countries being dragged into spats over trade with China is increasing, posing difficult decisions for governments.

Mr Trump has proposed tariffs of 10% or 20% on imports from around the world. Those from China face an even steeper suggested duty of 60%. That makes the average American tariff already in place, at around 12%, look modest. Quintupling the tariff on Chinese goods would make a broad swathe of products too expensive for American buyers. Chinese exports to America amounted to around \$500bn in 2023. That could drop by as much as 85% if the tariffs

Chinese cars could be banned from American roads

were implemented in full, according to one analysis.

But as well as affecting trade between the two superpowers, the commercial turmoil will spill over to the rest of the world in the year ahead. China's policymakers are likely to permit—or engineer—a fall in the yuan to blunt the impact on its manufacturers. That will drive down the cost of Chinese goods all over the rest of the world. Countries that once preferred to sit out of the trade tussle are already being pulled into the fight. In 2025 they will feel even more pressure to respond with their own trade restrictions.

Decisions by China's government are also raising the stakes. Investment in property fell by 10.1% between January and September 2024, compared with the same period in 2023. The crisis in the property market, once one of China's main engines of growth, has now been going on for more than three years.

In late September, Chinese stockmarkets began to surge, driven by hopes for more stimulative economic policy from Beijing. But so far, few policies that might revive consumer spending have been announced, and exports have been a more reliable source of recent economic growth. Investment in manufacturing rose by 9.2% in the first nine months of the year, helping to offset the pain. The combination of a moribund economy at home, and an American market which is being closed off to Chinese producers, means that surge of investment is producing industrial goods destined for other overseas destinations.

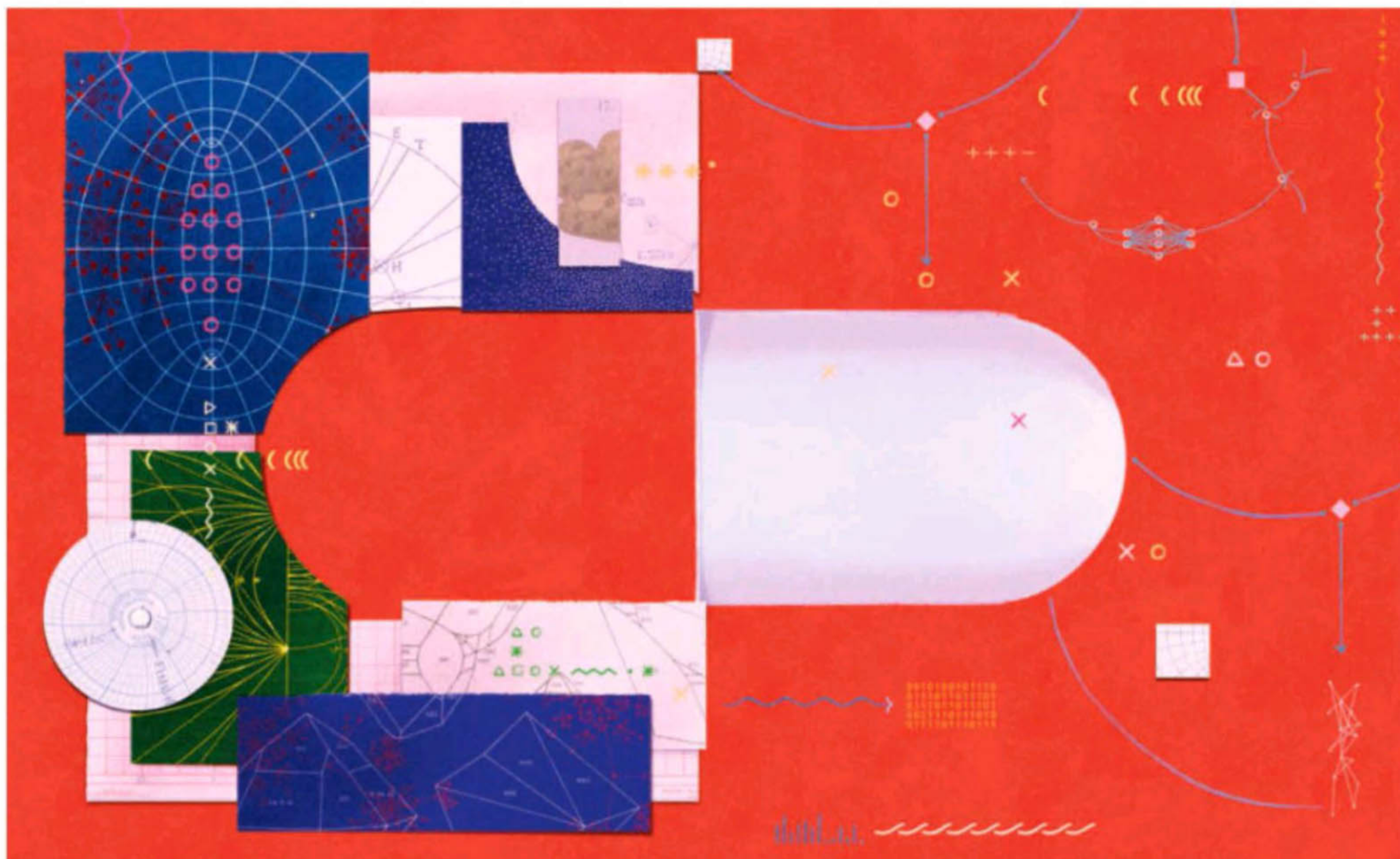
Around the world, electric vehicles (EVs) have already emerged as one of the foremost sources of tension, and one that looks likely only to grow. Back in 2018, China exported around 1m cars, which played very little role in the early trade tussles. That figure surged to 5m in 2024, and China has emerged as the world's largest car exporter, thanks in large part to its expertise in producing low-cost EVs.

Some countries have already raised steep walls against imports of Chinese cars. A proposal by America's Department of Commerce to prohibit the use of Chinese software in cars would in effect ban Chinese cars from American roads. In August the Canadian government imposed 100% tariffs on Chinese-made EVs. In Europe, the issue is still a matter of political discord. A proposal by the European Commission for tariffs of up to 45% on Chinese EVs faced opposition from the governments of Germany and Hungary, though those of France, Italy and Poland supported the new levies. Germany's car industry opposed the move, given the risk of retaliation from China, the industry's largest foreign market.

But the tensions are rippling out beyond the rich world. Many middle-income countries are weighing the pros and cons of accepting cheap Chinese goods and Chinese investment on the one hand, and protecting their own domestic producers on the other. Brazil, Chile and Mexico raised tariffs on Chinese steel imports in April. Countries in South-East Asia are also being dragged into the fray. In July, Indonesia's trade minister threatened tariffs of up to 200% in areas including ceramics, textiles and footwear. Malaysia's government is reviewing its anti-dumping duties against Chinese steel.

For countries around the world, both rich and poor, the effects of the trade war will become more and more difficult to avoid, particularly if the incoming Trump administration raises an almighty tariff wall. Sitting out the conflict is no longer much of an option. ●

Science & technology



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Making pharma go faster

Artificial intelligence will show its potential to speed up drug development

Shailesh Chitnis Global business correspondent, *The Economist*

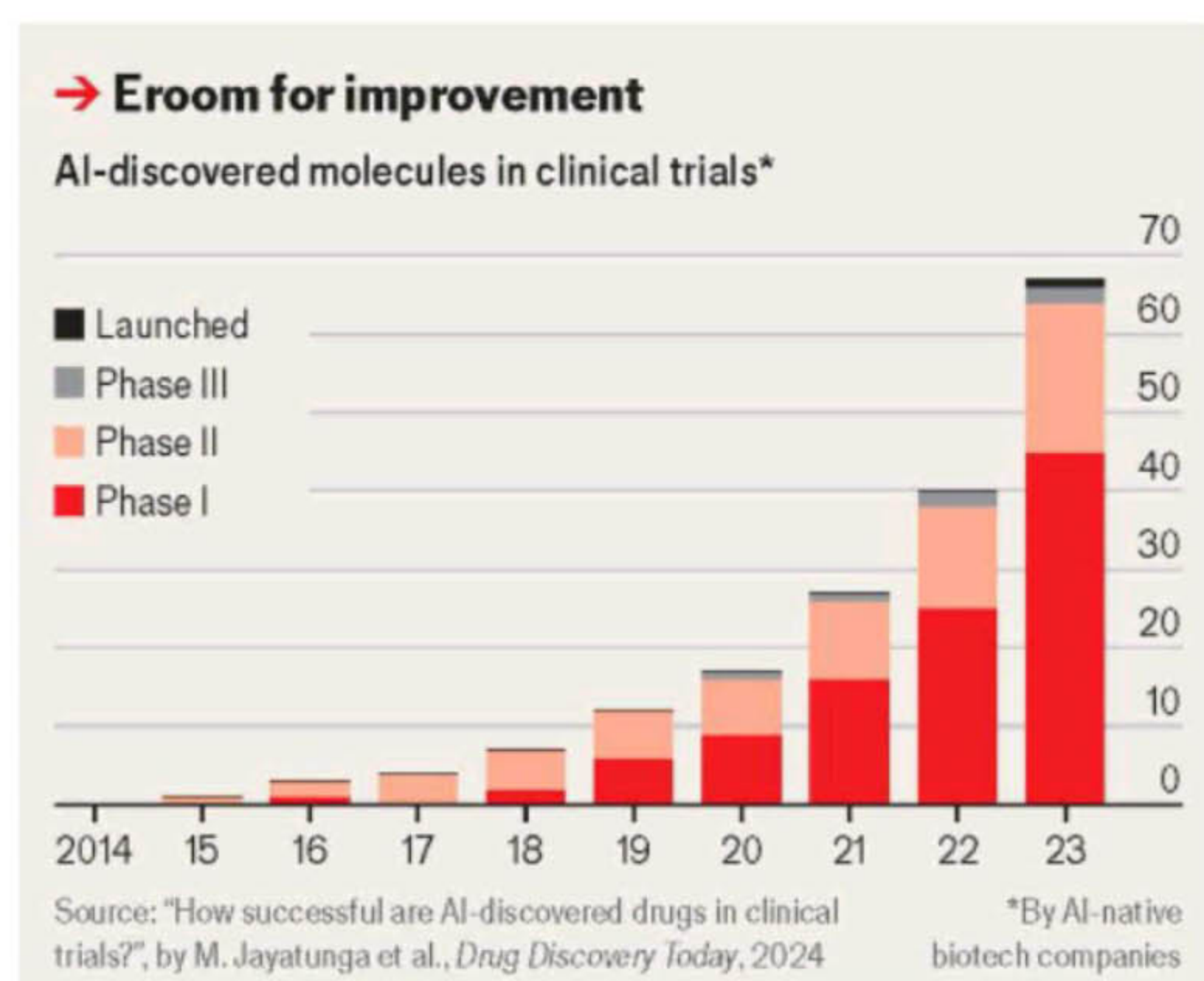
PROGRESS IN COMPUTING has long been described by Moore's law, a rule of thumb which says that the cost of processing power falls by half roughly every two years. The pharmaceutical industry follows an opposite rule. Its version, called Eroom's law ("Moore" spelled backwards), posits that the cost of developing a new drug doubles roughly every nine years. In the 1960s \$1bn (at 2008 prices) spent in research and development (R&D) yielded about ten new drugs. Today the same \$1bn isn't enough to produce even one.

On average, it now takes ten years and more than

\$2bn to develop a drug from start to finish. The risks are also steep—less than one-tenth of drug candidates that enter clinical trials are approved by regulators. In the past decade America's Food and Drug Administration has approved an average of just 53 drugs every year. Proponents of artificial intelligence (AI) say it has the potential to make drug discovery faster and cheaper—something that would be welcomed by pharmaceutical companies and patients alike. In 2025, as a wave of new drugs nears regulatory approval, AI will begin to fulfil that promise.

The process of developing a drug begins with identifying a target, such as a protein or gene, that is associated with a particular disease. Researchers then search for a molecule that can either block or enhance the target's activity. Once potential molecules are found, they are tested for safety and effectiveness first using computer models, and then on animals. This phase, known as the preclinical stage, can involve screening as many as 1m compounds before selecting just one or two promising candidates. All this can take years, and accounts for nearly a third of the cost of drug development, even before any human testing.

It is in this preclinical phase that drugmakers are using AI to boost their chances. The pharmaceutical industry has used computational models for decades, but AI is changing drug discovery in several ways. First, it improves researchers' understanding of diseases and their targets by analysing huge amounts of disparate data. Software can also pinpoint promising molecules and fine-tune their structures to boost their success in



AI-based methods could double the productivity of R&D

the usual time and expense required.

Breakthroughs in the preclinical phase have now progressed into the business end of drug development. BCG, a consultancy, estimates that about 65 AI-inspired molecules are currently in human trials (see chart). Around a third of these are in the second phase of clinical trials, in which the drug is tested for effectiveness and side-effects. Firms must then decide whether to move forward with more expensive phase-three studies on a larger population. Less than a third of drug candidates make that leap.

During 2025, results from this crucial second phase will be reported for more than half a dozen drugs. Some AI-designed drugs have already stumbled at this stage. BenevolentAI and Exscientia, two promising British AI startups, recently reported disappointing results in clinical trials for their drugs targeting eczema and cancer. Despite these setbacks, Christoph Meier of BCG believes that AI-based methods could double the productivity of R&D. And it seems likely that four or five AI-developed treatments, if not more, could go on to phase-three trials in 2025.

This is a small sample, but these medicines point to a profound change in drug development. Although AI has yet to shorten clinical-trial timelines, it is already helping pharmaceutical companies make smarter choices about which molecules to take forward, reducing failure rates and cutting costs. Research by Andreas Bender at Cambridge University, for example, shows that reducing failures in phase-two trials by just 20% could save nearly \$450m on a single drug's development. In computing, Moore's law has run out of steam. In the pharmaceutical industry, Eroom's law may soon face a similar fate. ●

▶ human trials. Generative AI can go a step further, by dreaming up entirely new molecules to test.

In 2020, AlphaFold 2, a model made by DeepMind, an AI laboratory owned by Google, stunned the scientific world by accurately predicting the structure of nearly every protein in the human body. In May 2024 its successor, AlphaFold 3, expanded its capabilities to other molecules that make up living things: proteins, DNA, RNA and small molecules called ligands. Such models are changing drug development by reducing months of trial-and-error experiments to just hours of computation. Insilico, a startup that uses AI to develop drugs, says its software identified a new drug target and designed a molecule suitable for human trials in only 18 months and at a cost of \$2.7m—a fraction of

A new hope

Thanks to mRNA technology, 2025 could be a big year for cancer vaccines

Natasha Loder Health editor, *The Economist*

AFTER DECADES of disappointment, efforts to create vaccines that can stimulate the immune system to fight cancer are showing renewed promise. Breakthroughs are possible in the coming year. The optimism stems from advances in mRNA technology and personalised medicine, and in particular from a melanoma vaccine called mRNA-4157, developed by Moderna and Merck, that is performing well in trials. In 2025 the FDA, America's drugs regulator, could approve the vaccine. And in Britain the NHS's Cancer Vaccine Launch Pad, a tie-up with BioNTech, a pioneer of covid vaccines,

aims to fast-track thousands of patients into trials for mRNA-based personalised vaccines for colorectal, pancreatic and melanoma cancers.

Personalised vaccines are tailored to a patient's specific mutations, and aim to train the immune system to recognise and attack cancer cells based on their unique genetic make-up. First comes a biopsy, then the sequencing of the tumour, the identification of mutations likely to generate proteins that would be recognised by the immune system, and finally the manufacturing of a vaccine to target those markers. This can all be done within six weeks, thanks to advances in mRNA technology made during the pandemic, and to progress in artificial intelligence, which is used to predict the molecular markers most likely to stimulate the immune system into action.

But the process is expensive, so parallel efforts are under way, by BioNTech and others, to develop "off-the-shelf" vaccines that work in wider populations by targeting common tumour markers. There is also growing interest in exploring vaccines' potential use as an adjuvant, or booster, to treatments in earlier stages of cancer, alongside surgery or chemotherapy. Some researchers think cancer

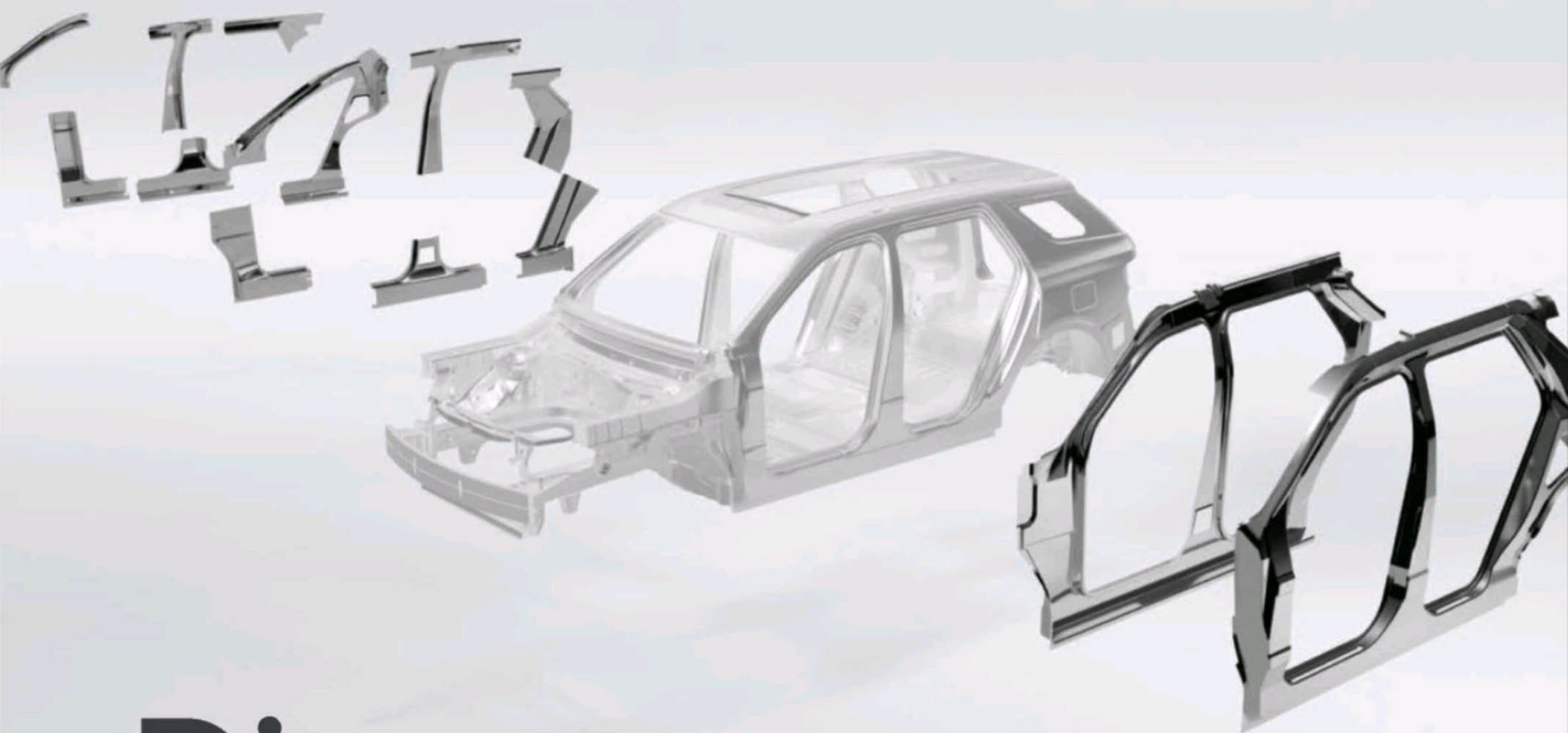
vaccines could one day even be used preventively in high-risk individuals.

Personalised cancer vaccines provide highly targeted treatment, but their complex manufacturing process makes them costly to produce. The coming year will be crucial. Success would be a vindication of the decades of effort spent trying to create a new way to fight cancer. But with so many past failures, those in the field are taking nothing for granted. ●





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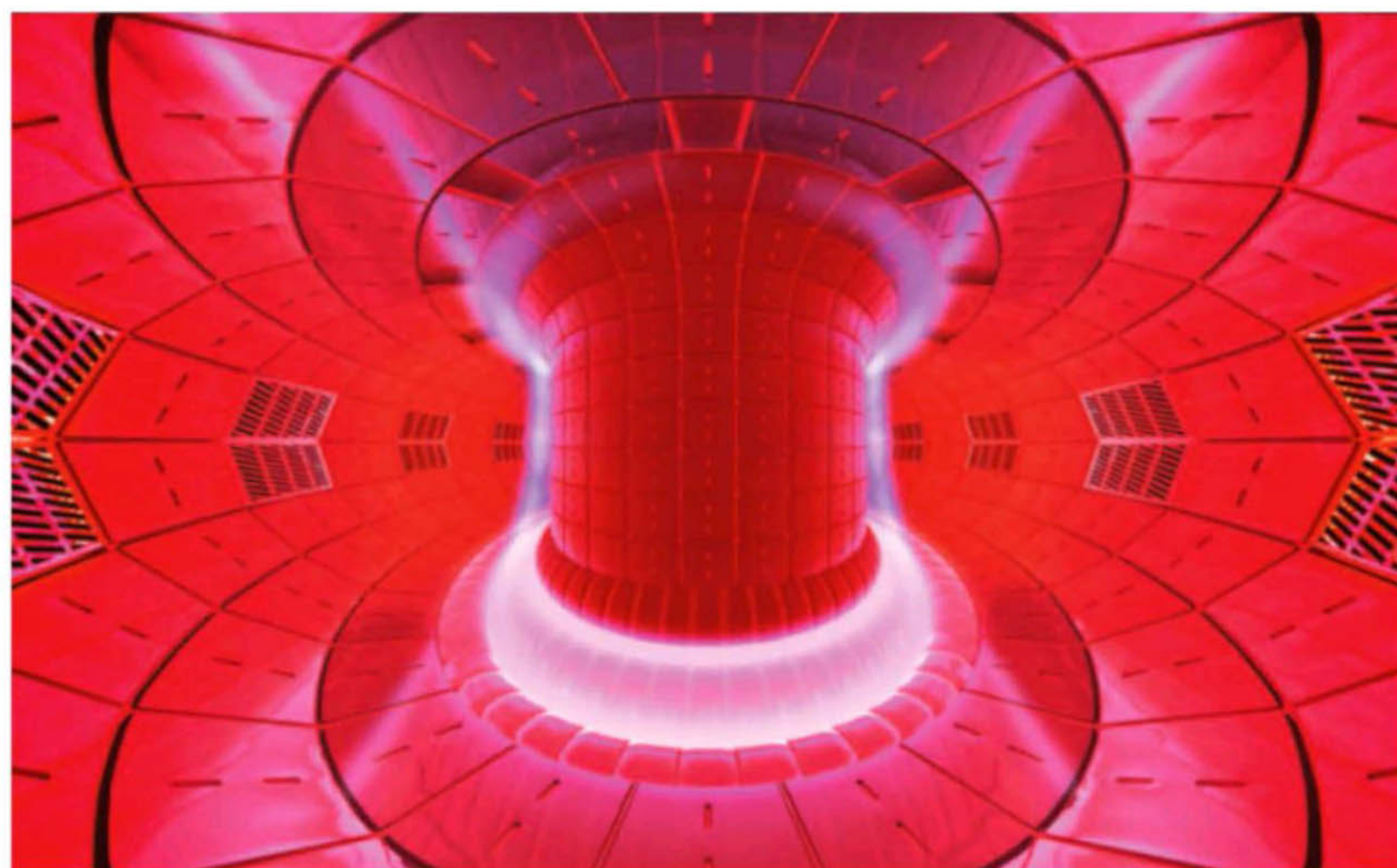
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Fusion power is getting closer

The action is shifting from the public to the private sector

Geoffrey Carr Senior editor,
Science & technology, *The Economist*

TWO DEVELOPMENTS in the coming year will mark a decisive shift from the public to the private sector in the decades-old quest to generate cheap and abundant power from nuclear fusion. The first will be the opening towards the end of 2025, by a private firm, of a machine called SPARC. This will be the first fusion reactor, public or private, designed to operate at near-commercial scale, with an eventual output of about 140 megawatts (MW). The second will be the non-opening of ITER, the flagship of intergovernmental fusion collaboration, which was scheduled to be ready in 2025. In a hurried announcement in July, that date was postponed.

SPARC is being built by Commonwealth Fusion, a spin-out from the Massachusetts Institute of Technology. Design-wise, it is a tokamak. This is a machine with a toroidal (ie, doughnut-shaped) reaction vessel surrounded by powerful electromagnets which confine and heat the fuel. That fuel is a plasma of two exotic isotopes of hydrogen: deuterium and tritium. These, when suitably heated and confined, undergo a fusion reaction that liberates helium, neutrons—and a lot of energy.

ITER is a tokamak, too, with an intended power output of 500MW. Unfortunately for the 35-country collaboration building it in France, it won't be ready in 2025. In fact, it is nine years behind schedule, and will not be switched on until 2034. Commonwealth Fusion hopes to reach "Q>1", the point where a reactor releases more energy than is put into it, in early 2026. ITER will not, on its new schedule, reach this point until 2039.

If SPARC works and provides the data that Commonwealth needs to build a full-scale power plant (scheduled for the early 2030s), that will probably be the end of ITER. And even if things do not go to plan for Commonwealth, it is not alone in trying for fusion with private money.

The latest estimate from the Fusion Industry Association, a trade body, suggests that \$7.1bn has been raised by more than 40 firms with fusion in their sights. Many are still tiny startups, but several have more than \$200m in funding.

Some of these firms are pursuing more exotic approaches than tokamaks, which have, until now, been the tried-and-trusted design for fusion research. General Fusion, a Canadian firm, plans to compress and heat a deuterium-tritium plasma in liquid-metal cavities. A test reactor, in which the compressing metal remains solid, should switch on in 2025.

Helion, in Washington state, proposes a different fuel: a mixture of deuterium and an unusual isotope of helium. Its latest test-bed, Polaris, should also be up and running in 2025. Zap Energy, also based in Washington state, is reviving a once-obsolete approach called Z-pinch. ENN, of Hebei province in China, plans to fuse hydrogen and boron. In short, if Commonwealth Fusion fails to deliver, many other startups are lining up right behind it. ●

Sensitivity about climate

Supercomputers and AI are helping to build better climate models

Rachel Dobbs Environment editor,
The Economist

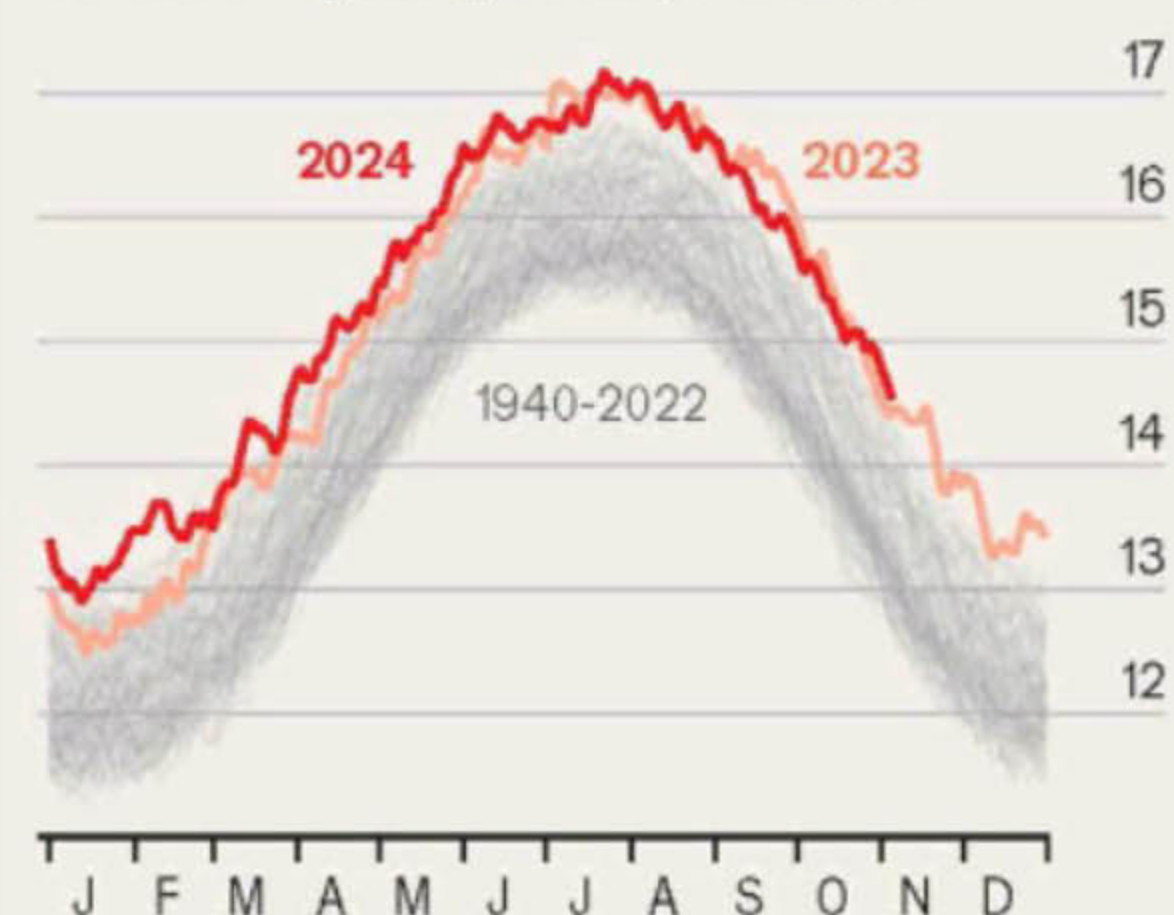
AT THE END of the 19th century Svante Arrhenius, a Swedish chemist, made one of the first concerted attempts to work out the relationship between Earth's average temperature and the amount of carbon dioxide in its atmosphere.

The idea of the planet's "climate sensitivity" underpins all understanding of climate change, and attempts to try to mitigate it. Arrhenius laboriously deduced that doubling atmospheric CO₂ would warm the climate by 5-6°C. More than a century of effort has refined that estimate, but plenty of uncertainty remains. The most recent assessment from the Intergovernmental Panel on Climate Change, the UN body responsible for evaluating climate research, concluded that it was "very likely" that doubling CO₂ would raise temperatures by 2-5°C. Advances in climate science during 2025 may help reduce the uncertainty.

Climate sensitivity is tricky to pin down because the atmospheric system involves a dizzying array of processes and feedback loops. Among the most crucial are aerosols and clouds, both of which can have either a cooling effect by reflecting sunlight, or a warming one by absorbing heat. Scientists have struggled to make models fine-grained enough to account for the intricate microphysics of aerosols and clouds, and

→ The heat is on

Global average daily air temperature, °C



Source: Copernicus, ERA5

ECONOMIST
IMPACT

Why is no country effectively preventing and managing obesity?

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Despite the evidence, obesity is commonly misconceived as being a result of poor choices made by individuals, leading to stigma and discrimination about weight.

Policymakers need to understand that what happens inside and outside of people's bodies causes obesity, in order to design appropriate policy measures. Research shows that "will power" has the smallest effect on controlling food intake. Yet few people know this.

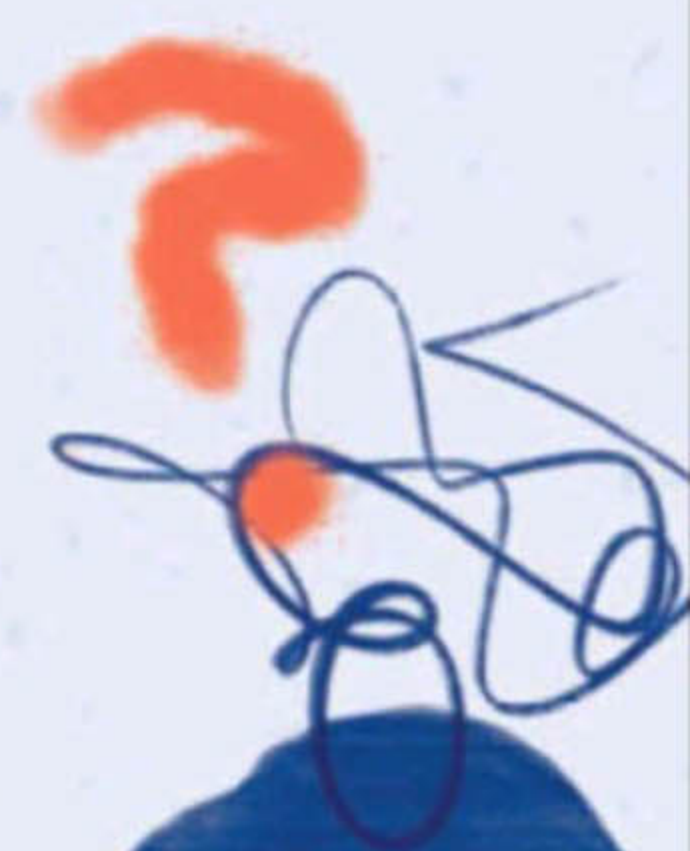
This is where Economist Impact's "Science of Obesity" series comes in, to explain the biological, environmental, social and psychological basis for obesity. Creating effective policy interventions to prevent and manage the disease requires understanding the complex, interconnected causes.

It is possible to slow, and even reverse, global obesity rates, but it will take collaboration, political will and a whole-of-government and whole-of-society commitment. The first step is to recognise that obesity is due to genetic, physiological, social and environmental factors.



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► have been forced to rely on simplified versions of how they think the underlying processes might work. The result is uncertainty around their projections.

An alternative approach is to examine the behaviour of aerosols and clouds in the real world. The coming months look promising in this regard. In recent years NASA and the European and Japanese space agencies launched satellite missions to monitor aerosol-cloud interactions and the mechanisms behind them. Results are expected to arrive during 2025.

Scientists have also been fine-tuning methods to examine how the climate has previously reacted to changing levels of CO₂. Using proxies such as ice cores, tree rings and sediment from the ocean depths, they have built a more accurate picture of the conditions in the distant past. In

September, a landmark paper published in *Science* detailed the first reconstruction of Earth's temperature over 480m years. The authors achieved this by combining biological proxies and records of plate tectonics, and filling in the gaps with simulations from climate models. This allowed them, for the first time, to arrive at a rough estimate of climate sensitivity over geological time scales.

The figure arrived at (an average temperature increase of around 7.7°C for a doubling of CO₂) was surprisingly high, and is likely to be re-evaluated in future. But the project highlighted the importance of taking even the slowest feedback loops into account, which will inform new efforts to reduce uncertainties.

Palaeoclimatologists have been helped by advances in supercomputers and

artificial intelligence, both of which are being incorporated into new climate models. The first data from CMIP7, a new generation of international climate models, should become available at the end of 2025.

But even the slightest clarification of how sensitive the climate is to CO₂ will be beneficial. In recent years, repeated spates of record-breaking temperatures across land and sea have fuelled concerns that the pace of climate change might be speeding up (see chart on previous page). Scientists have yet to reach a consensus on this. But everything hinges on the question of how the climate responds to extra emissions. If its sensitivity has been underestimated, that could dramatically change the future trajectory of the climate—and the steps humans might take to change it. ●

Watch this space

Humans may fly around the Moon, and robots will explore new frontiers

Tim Cross Senior science writer,
The Economist

BY THE END of the coming year, astronauts are due to return to the Moon for the first time in more than half a century. Regular readers may find that sentence familiar. That is because we made exactly the same prediction in the previous edition of *The World Ahead*. At the time, the target date for the first crewed flight of America's Artemis programme—which aims to return humans to the Moon, starting with a lunar fly-by mission—was late 2024. But worries over the Orion spacecraft's heat shield and life-support systems delayed things.

Assuming those problems have been fixed, at some point in late 2025 four astronauts are due to take Orion for a ten-day test drive. They will not land on the Moon, but will trace a figure-of-eight orbit, before looping back around to Earth. But the mission could, once again, be delayed.

In 2025 India may join the Soviet Union, America and China in the club of countries that have sent astronauts to space on domestically developed rockets. Like Artemis, India's Gaganyaan human-spaceflight programme has suffered delays. But ISRO, India's space agency,

hopes that at some point in the coming year its astronauts will blast off to spend several days in low-Earth orbit.

Elsewhere, the focus will be on uncrewed missions. In May 2025 a Chinese probe called *Tianwen-2* will depart for 469219 Kamo'oalewa, an asteroid which orbits very close to Earth. In December 2025 a joint European-Japanese probe called *BepiColombo* will become only the third spacecraft to visit the planet Mercury. The European Space Agency (ESA) is planning the first flight of Space Rider, a reusable space-plane. Like the Space Shuttle, it is designed to be launched by rocket into orbit before gliding back to Earth to be flown again. Unlike the Shuttle, Space Rider is a robotic space laboratory.

But these days space is increasingly the preserve of private companies as well as government agencies. Today's space superpower is not NASA or ESA or ISRO, but

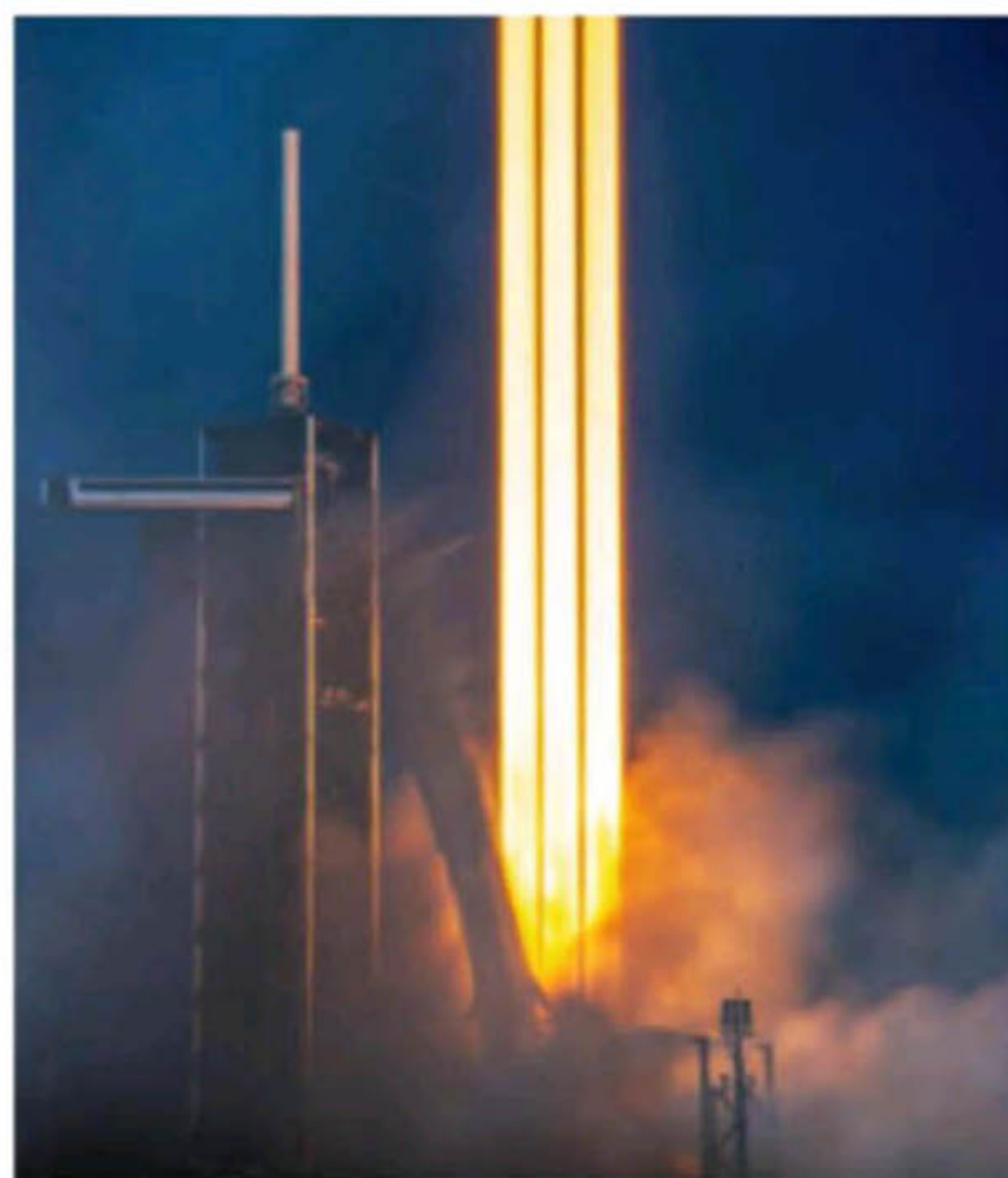
SpaceX, a private American firm founded by Elon Musk, which flies more mass into orbit each year than every other company and country in the world combined.

In 2025 SpaceX will conduct more tests of its giant Starship rocket. It will continue deploying Starlink, a constellation of thousands of satellites that can beam high-speed internet to almost anywhere on Earth. In 2025 Starlink will switch on its "direct-to-cell" service, which will allow ordinary smartphones to talk directly to Starlink satellites, providing mobile-phone reception in areas that lack coverage.

Amazon, a tech giant, has been developing its own Starlink-style satellite constellation, called Kuiper. It plans to begin offering the service in 2025. Rocket Lab, a firm founded in New Zealand, hopes to make the first flight of its Neutron reusable rocket, building on the success of Electron, its existing, smaller vehicle.

Several privately funded Moon missions are due to launch on a single SpaceX rocket in January, involving robotic landers and rovers. Vast, an American firm, plans to launch *Haven-1*, a privately run space station with room for four astronauts. But perhaps the most eye-catching private venture is the *Venus Life Finder* (VLF), a joint effort between the Massachusetts Institute of Technology, Rocket Lab and some anonymous philanthropists. Due to launch early in 2025, this robotic probe will carry a single, simple instrument to look for signs of life in the cool upper layers of Venus's clouds.

The giant NASA rocket that is due to take America's astronauts back to the Moon costs around \$4bn per launch. The total cost of VLF, by contrast, is projected to be less than \$10m, including launch. Governments have long ruled the roost. But space exploration is now something wealthy private citizens can pursue, too. ●



↑ *We have lift-off*

By Invitation

The new economics of renewable energy

WHAT IF WE could make cheap fuel out of thin air? For more than a century, a bewildering variety of methods has been attempted to make drop-in replacements for fossil fuels. Such synthetic fuels could be used with existing energy, transport and industrial infrastructure, collectively worth over \$100trn.

Petrol, diesel, kerosene, propane, oil, natural gas and rocket fuel are all hydrocarbons. Synthetic fuel therefore needs sources of hydrogen (from water) and carbon (from atmospheric carbon dioxide). Nature has used this recipe to make living things, including humans, for billions of years. Before the Industrial Revolution, plants were our primary source of fuel. But plants do not use solar energy efficiently enough to make replacements for fossil fuels. Is there another way to use water and air to make huge amounts of cheap fuel?

Whatever process we use will require vast quantities of energy. Synthetic fuel is made by converting electrical energy into chemical energy. But ripping water and carbon-dioxide molecules apart to make fuel requires as much energy as is subsequently released via combustion, and more besides. If done using electricity obtained from the grid, powered by combustion of coal or natural gas, fuel synthesis cannot be cost-competitive with fuel-mining. We need new energy sources that are abundant, cheap and less environmentally harmful than fossil fuels.

And what is the cheapest, most scalable source of energy humanity has ever known? Solar photovoltaics. Carbon-free, zero moving parts, no uranium enrichment, and no specialised labour required. Solar cells are panes of glass that print wealth. We should

Solar power is about to transform the economics of energy, argues Casey Handmer, founder of Terraform Industries



deploy them accordingly.

It turns out that converting between chemical and electrical energy is about 35% efficient in either direction. Conventionally, burning fuel to make electricity has been the natural economic flow. But once solar energy costs less than 10% of the price of grid power, the economics favour the conversion of electricity into carbon-neutral chemical fuel. This is just a few years away. Solar is getting 15-20% cheaper every year as manufacturing becomes more efficient. Solar synthetic fuel

Cheap and abundant solar power, directly from the array, will transform dozens of industries

will soon be cheaper than conventional fuel in some markets, and by about 2040 it will be cheaper everywhere.

I noticed this trend four years ago, and resolved to make this vision—of unconditional energy abundance—a reality. I quit my job writing software at NASA's Jet Propulsion Laboratory and founded Terraform Industries. I raised seed funding from investors who shared my forward-looking optimism, hired the smartest engineers I knew, and got to work. At Terraform, we're now making cheap, synthetic natural gas from sunlight, water and air.

Our "Terraformer" system is a compact chemical plant designed to integrate directly with a one-megawatt solar array in the field—so there are

no electricity-transmission costs. It contains an electrolyser (to make hydrogen from water), a carbon-capture system (to extract carbon dioxide from air) and a Sabatier reactor that combines the two to make synthetic natural gas (methane). The whole thing is powered by solar energy.

So far we've shown that we can produce hydrogen for less than \$2.50 per kg, carbon dioxide for less than \$250 per tonne, and pipeline-grade synthetic natural gas for \$35 per thousand cubic feet (MCF). This puts us in economic contention in many markets that rely on imported fuel.

We won't rest until we've saturated the global market for any hydrocarbon at a price cheaper than fracking. We have significant further cost reductions on the way, and a pathway for developing liquid fuels from methanol. In 2025 we expect to be able to produce hydrogen for well below \$2/kg. Our full-scale Terraformer, which we will demonstrate in the next few months, will produce 2,300 MCF of natural gas per year. (A typical home uses about 70 MCF a year for heating and cooking.) We need to deploy millions of these over the next couple of decades to meet global demand.

Cheap and abundant solar power, directly from the array, will transform dozens of industries beyond fuel production. It can be used for desalination, cement production, to provide industrial heat and to make fertiliser. Solar power unlocks incredible material wealth for all of humanity with a mere fraction of Earth's land area under panels. And, of course, moving beyond finite fossil fuels to abundant solar energy solves the carbon-emissions problem—in addition to supercharging global economic growth. ●

Culture



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From Marvel to Mario

Move over, superheroes. Films based on video games are the next big thing

Alexandra Suich Bass Culture editor,
The Economist

GOD MAY have created the world in six days; that is also how long it took Markus Persson, a Swedish developer, to design the first version of “Minecraft”. Permitting users to build their own worlds and visit others’ creations, it became the most successful video game of all time, surpassing 300m sales worldwide. Profits that dramatic were sure to attract Hollywood’s attention and inspire plans for a sequel, of sorts. In 2025 “Minecraft” the film, starring Jack Black, an American actor, will come to the big screen. It will serve as a pixelated pulse-taking of audiences’

appetite for adaptations of their favourite games.

Video games are big business—and are inspiring big plans in Hollywood. In addition to “Minecraft”, cinemas will, in 2025, host “Mortal Kombat 2” and “Five Nights at Freddy’s 2”, both based on popular games. Some 30 projects adapting video games into films and television series are in development, according to IGN, an entertainment website.

“We’re seeing a content reset at the big studios,” says Alice Thorpe of Ampere Analysis, a research firm. Superheroes have lost their invincibility; studios are scanning their catalogues and intellectual property to find their next golden goose. Many have come to believe that video games could be the new comic books, providing recognisable characters with the power to conquer big and small screens.

Video games come with several advantages. Chief among them is cultural and commercial cachet. Gaming is the largest sector of entertainment, by most estimates surpassing the sales of film and recorded music combined. Video-game properties also have a built-in fan base. Look no further than the Game Awards, the industry’s annual show, for proof: in 2023 it attracted 118m viewers, six times more than tuned into Hollywood’s mainstay, the Academy Awards.

Hollywood’s experience adapting video games has not always been a happy one, however. The coming year will mark two decades since the release of a film based on “Doom”, a classic first-person shooter game. Its title became a four-letter summary of its fate—and that of many other game adaptations.

► Risk appetite for adaptations started to change thanks to the small screen. Successes on streaming services included “The Witcher” (2019) and “Arcane” (2021) on Netflix. HBO’s “The Last of Us” (2023), set in a post-apocalyptic America, won critical acclaim and Emmy awards, while staying faithful to the original game. The second season is expected in 2025.

Then there was the breakout film of 2023, “Super Mario Bros”, which was the second-highest performing film of the year (after “Barbie”), taking nearly \$1.4bn globally at the box office. It set a model of appealing to children and parents alike, reimagining a game as a “nostalgia play” for people who grew up with it, says Ms Thorpe.

There are three things to watch out for in the coming year. One is how video games are changing who participates in Hollywood. “More and more game creators are getting involved creatively” in the development of film and television properties, says Geoff Keighley, who hosts the Game Awards. This can be good, to the extent that it preserves a game’s authenticity and helps it translate to film or television. Of course, creators are also hopeful that an adaptation can propel game sales, as occurred with “Fallout” (2024), a post-apocalyptic show that drove new users to the role-playing games on which it was based.

Second, Hollywood will more deeply embrace video-game technology in film-making. It is already changing visual effects in profound ways. Studios now

Video games are changing who participates in Hollywood

use game “engines”, first devised to make video games, to implement intricate special effects on set. Instead of green screens, studios can use huge wraparound screens showing a background scene in real time (rather than adding it after filming). As game engines spread in Hollywood (and not just in video-game adaptations), they will change the way actors, directors and set-designers do their jobs—and make for more visually spectacular experiences.

Third, watch how Hollywood integrates some of video games’ storytelling techniques and action sequences into films. Video games are starting to “provide a fresh source of inspiration to film-makers”, says Hermen Hulst of Sony Interactive Entertainment. Much as there were debates about video games’ impact on society, there are sure to be discussions about whether video games rub off on Hollywood, for example by making films more violent.

The coming year will also offer a reminder of entertainment’s new pecking order. The biggest release of 2025 is not going to be a Hollywood production but a video game, “Grand Theft Auto 6”, the first version of the epically popular game to be released in more than a decade. Mr Keighley predicts it will be the “biggest entertainment launch of all time”. It will be “bigger than any movie, any streaming show, any music show”, he says. When it comes to games, Hollywood, known for its rivalries and jealousies, is no longer the leading star. ●

Universally acknowledged

The 250th anniversary of Jane Austen’s birth will be widely celebrated

Rachel Lloyd Deputy culture editor, *The Economist*

FEW WRITERS remain the height of fashion 250 years after they were born. No one talks about Charles Lamb as a must-read essayist, or Elizabeth Benger as a trendy poet. But two and a half centuries on from her birth (on December 16th 1775), Jane Austen stands unchallenged as the greatest romance novelist of all time. “Pride and Prejudice” alone has sold more than 20m copies. The coming year will be marked by declarations of admiration from her legions of fans around the world.

Many will don breeches or gowns in Austen’s honour. The English city of Bath, where she lived in 1801-06, will host several costume balls. Academic symposiums will take place in countries including Australia, France and Japan.

At Austen’s last residence, in Chawton,

Hampshire, a permanent exhibition about her creative process will be unveiled. The museum is also staging a series of festivals—each dedicated to a different novel—and an eight-day birthday celebration in December. Several books about her life and times will be published. A television show, “Miss Austen”, examining Jane’s relationship with her sister, Cassandra, will air on PBS in America and the BBC in Britain.



Gen Z is surprisingly keen. There have been hundreds of thousands of videos on TikTok about Austen and her work—many of them about her brooding romantic hero, Mr Darcy. To appeal to this younger crowd, Penguin will republish all six of Austen’s novels with colourful new covers.

“Pride and Prejudice” remains the most popular of Austen’s novels, with numerous film and TV adaptations. It has also inspired many other stories. Helen Fielding says she “pinched the plot” and the character of Mr Darcy for her blockbuster novel, “Bridget Jones’s Diary” (a fourth Bridget Jones film will be released in 2025). An adaptation of “Unmarriageable”, a novel by Soniah Kamal which transposes the story of “Pride and Prejudice” to Pakistan, is also due to start filming in 2025.

It is no coincidence that “Bridgerton”, Netflix’s hit Regency-era romance, opens in 1813, the year “Pride and Prejudice” was published. The show, based on a series of books by Julia Quinn, borrows Austen’s marriage plots and has a perspicacious, ironic narrator typical of Austen’s tales. In the latest season, a bookish character can even be seen toting a copy of “Emma”.

Given this astonishing cultural legacy, it is striking that Austen’s tombstone in Winchester Cathedral makes no mention of her writing. There will be some redress in 2025. A life-size statue is to be installed in the cathedral gardens, depicting the author beside her desk, with paper, quill and ink at the ready. ●



Losing your marbles

The restitution and repatriation of cultural heritage will accelerate

Max Norman Culture correspondent, *The Economist*

THE PARTHENON MARBLES have not budged from the literal and figurative centre of the British Museum in London since they were purchased from Lord Elgin in 1816. The sculptures—about half of the marbles that survive from the temple in Athens—have also been at the centre of the world's most famous dispute over cultural property since Greece formally demanded their return in 1983.

But in 2025, the marbles may finally be on the move—or, at least, negotiations about their status might take a big step forward. Many arguments against returning them have been toppled. The idea that the British Museum is the only competent custodian for the marbles has always seemed slightly spurious, even more so after one of its staff was accused of pilfering almost 2,000 antiquities and selling them on eBay. Just as powerful is a shift in

A generational shift in leadership has changed attitudes

public sentiment: a YouGov poll conducted in 2023 found that 49% of Britons were in favour of handing them back, and just 15% believed they should remain.

The British Museum itself, and the government, also seem ready. A law from 1963 prohibits the museum from giving away its treasures, and the government is not likely to revise it. But both the museum's chair, George Osborne, and its reform-minded new boss, Nicholas Cullinan, support a long-term loan of the marbles, perhaps borrowing other antiquities from Greece in return. The prime minister, Sir Keir Starmer, has indicated that he would not stand in the way.

Greece has publicly rejected anything less than full ownership, but a swap of some kind remains the most realistic outcome. That could offer a model for how the museum might manage the 99% of its stock that sits in storage. Dame Mary Beard, a trustee, has suggested the museum could become a "lending library" for the world. Loans would let it share its sometimes contested collection while burnishing its image. (In 2022 a museum in Sicily loaned Greece a fragment of the marbles in exchange for another sculpture.)

A deal with Greece would also represent the crest of a wave of restitutions that have occurred in the marbles' shadow. Museums are "less hamstrung" by politics on less high-profile items, notes Alexander Herman, the author of a book on the dispute. In the past few years, restitution has become a regular event.

Many items have gone back to Mediterranean countries from which they were taken, such as Italy and Turkey. Campaigners in Cambodia have also convinced the Metropolitan Museum in New York, among others, to return stolen sculptures. In Africa, Nigeria has led the way, securing dozens of bronzes—looted by the British from the Kingdom of Benin in 1897—from German, American and some British institutions.

Objects are also beginning to flow back to Cameroon, Indonesia and Nepal. And Belgium recently gave the Democratic Republic of Congo a catalogue of 80,000 items in its African Museum, an apparent prelude to returns. Bénédicte Savoy, a historian who has advised President Emmanuel Macron of France on the restitution of items to African countries, predicts that China, India and Vietnam will begin to make more vocal requests.

Legal action has helped drive restitution in America. In New York, the Manhattan district attorney's Antiquities Trafficking Unit has wielded state law to return improperly exported objects. (Unusually, two museums in the Midwest and a private collector in Los Angeles are suing to block the unit's seizures; court rulings may curtail its authority outside New York state.) The 1990 Native American Graves Protection and Repatriation Act has resulted in the return of thousands of human remains to Native American tribes, though many are still in museums.

Most restitutions, however, will remain voluntary. Public awareness of the issue is growing both in the art-rich West and in the countries asking for objects back. There has also been a "generational shift" in leadership, notes Dan Hicks, author of *The Brutish Museums*, a book on the repatriation debate. Due diligence on provenance is now essential, and restitution is no longer a dirty word. Previous efforts have faltered. But, Mr Hicks says, the idea of the museum as "a prison cell, where objects go to die" is now itself a historical relic. ●



Touching down

The NFL will play more games abroad in 2025 than ever before

Jon Fasman Senior culture correspondent, *The Economist*

GEORGE WILL, a baseball-loving conservative columnist, once wrote that American football “combines the two worst things about America. It is violence punctuated by committee meetings.” Within America, Mr Will’s opinion is not widely shared: in 2023, 93 of the 100 most-watched television broadcasts were National Football League (NFL) games. In the rest of the world, American football remains niche at best, but the NFL is trying to change that. In 2025 the league will play eight games abroad—more than in any previous season.

The Super Bowl already has an international audience. In 2024 a record 62.5m people outside the United States tuned in—10% more than in 2023 (a leap perhaps helped by Taylor Swift, a singer, dating Travis Kelce, one of the best players of the victorious Kansas City Chiefs). And the league has played some preseason games abroad for decades. Since 2007 it has played at least one regular-season

game each year in London, and a total of four games in Mexico City and three in Germany. In 2024 the league played its first game in Brazil. In 2025 it will play in Spain for the first time, and is reportedly considering Australia, Ireland, Japan, Italy, France and Abu Dhabi for future fixtures.

The NFL has also changed how it markets itself overseas. For years, explains Scott Rosner, who teaches sports management at Columbia University, teams could market themselves abroad, but any revenue went to the league, which would divide it among the 32 teams. Since 2022, however, the league has let teams apply for the rights to treat countries as “home” markets, allowing them to keep revenue, as they do for home games.

Today, 25 teams are trying to build fan bases abroad. The Miami Dolphins focus on three Spanish-speaking countries; the Rams, who play in heavily Asian-American Los Angeles, are cultivating fans in Japan and China. Teams eschew the hyper-patriotic packaging in which the NFL wraps itself domestically and opt for partnerships with local ad agencies who know the market. They also set up participatory events such as camps for flag football, a non-contact version in which, instead of tackling, players have to grab a flag attached to their opponents’ kit.

The league has invested deeply overseas in flag football, which will be an Olympic sport for the first time in 2028. It requires less equipment but still accustoms players to the game’s arcane rules. American football may never replace the beautiful game, but more languages may soon need to find translations for “touchdown”, “linebacker” and more. ●

Pay more, watch less

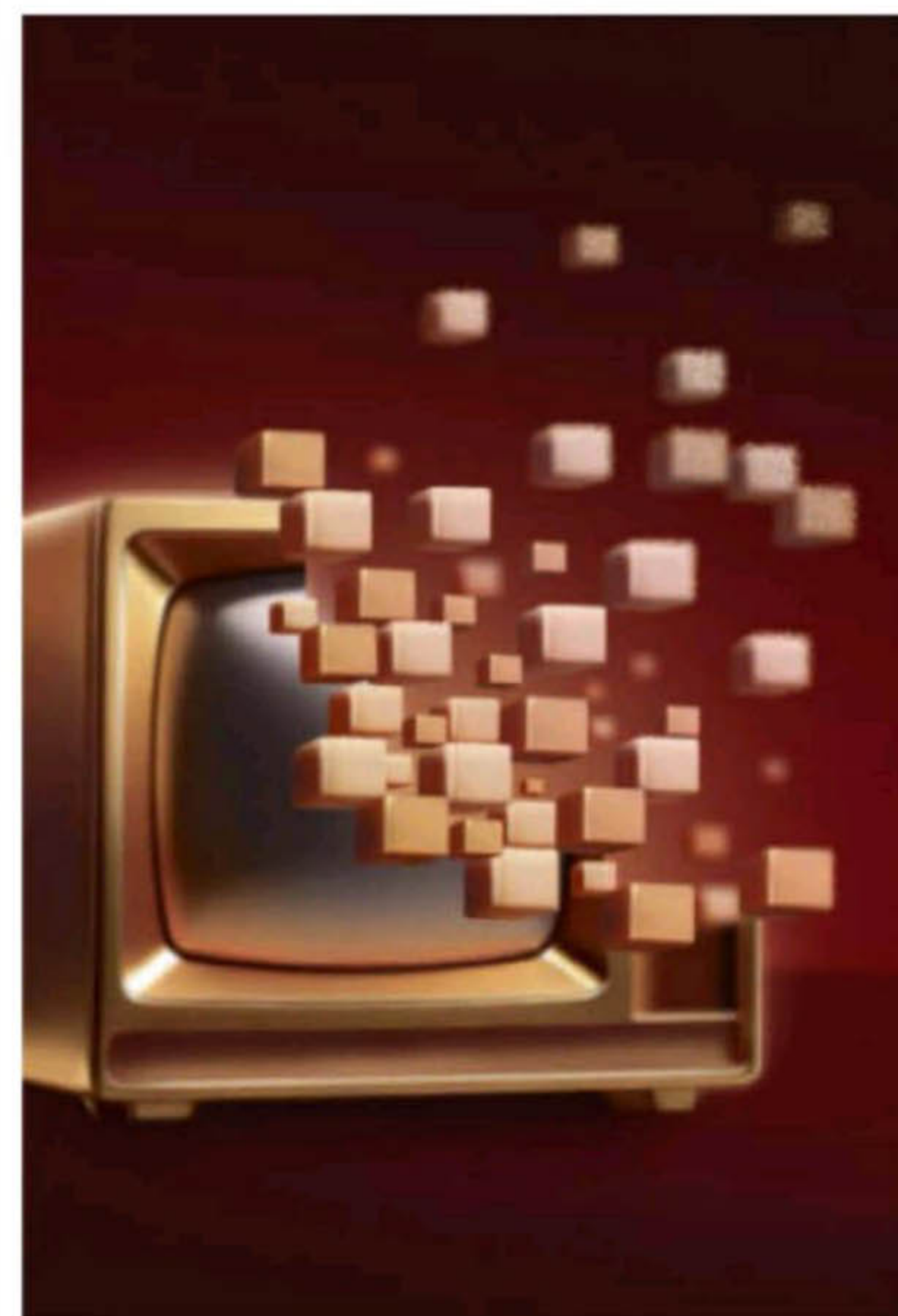
Television’s golden era of streaming comes to an end

Tom Wainwright Media editor, *The Economist*

AN EMBARRASSMENT OF riches awaits television and film audiences in 2025, as projects that were delayed by a Hollywood strike in 2023 reach the small and big screens at last. New instalments of “Avatar”, “Mission: Impossible” and “Captain America” will jostle for attention at the cinema. At home, viewers will settle down for more of “The White Lotus” and the final chapter of “Stranger Things”.

But audiences should enjoy it while they can because, behind the scenes, the tap of fresh content is being tightened. At the same time, prices are rising and commercial breaks are finding their way into streaming services that were previously ad-free. As investors become impatient for profits, a golden age of cheap, abundant entertainment is giving way to a period of austerity.

For the past five years, as cable television has gone into ever-steeper decline, Hollywood studios have done everything they can to sign up customers to their streaming services, splashing out on content and selling it at ludicrously low



► prices. Disney+ launched in 2019, offering access to the glittering Disney back catalogue, from “Snow White” to “Star Wars”, for \$6.99 a month. As households rushed to sign up, so did investors.

Yet making money from streaming is proving harder than expected. Netflix, its largest exponent, is making steady profits. Disney’s streaming division broke even in the second quarter of 2024. But most of Hollywood’s older studios are still losing money on their digital ventures, and shareholders are jumping ship. Shares in Warner Bros Discovery, which lacks theme parks or a broadband business to prop up its anaemic TV and film earnings, have lost 70% of their value since the combined company was formed in 2022.

An industry-wide economy drive is therefore under way, to bring studios back into the black. Most have already slashed their budgets: Disney’s outlay on content, excluding sport, was 30% lower in 2024 than in 2022. Even Apple, with near-

bottomless cash reserves, is said to be curbing its TV-commissioning enthusiasm. At the same time, customers should prepare for higher prices. Disney+ already costs more than twice what it did at launch, and the company is cracking down on password-sharing. Amazon Prime Video has begun slipping advertising into its programming. The year ahead is likely to see more of this: some wonder if Apple TV+, the last big ad-free service, will roll out commercial breaks in 2025.

Streamers will also try to squeeze more money from subscribers by bundling their services together. Disney and Warner Bros launched a package of their streaming services in 2024, and Comcast, the cable company that owns Universal, offered its broadband customers a bundle of Netflix and Apple TV+ along with its own streaming offering, Peacock. Streamers hope that rolling services together might help reduce customer churn. Disney plans to launch a streaming version of its ESPN

sports service in 2025, which is likely to be offered as part of a bundle with its other streaming apps.

Even these initiatives may not be enough to get some studios out of the red. So the year ahead could see some more radical changes. In 2025 Paramount, one of the world’s oldest film studios and the last still based in central Hollywood, is expected to complete its sale to Skydance Media, a production company run by David Ellison, a millennial heir to a tech fortune. Rumours abound that more tie-ups will follow now that America’s election is out of the way.

Some combination involving Comcast and Warner is possible. So is a partnership including Fox Corporation—though that will depend on the will of its controlling shareholder, Rupert Murdoch. With Mr Murdoch due to turn 94 in March, TV-watchers are increasingly looking ahead to the next chapter in that long-running succession drama, too. ●

Long story short

China’s one-minute micro-dramas are flourishing at home and abroad

Nicole Fan 1843 intern, *The Economist*

“CUT!” BARKS the director, and chaos erupts at a film studio in Los Angeles. Actors rush off to change their costumes, while crew members scramble to arrange new props. It is only the second day of filming and they have already crammed in a week’s worth of cliffhangers. Filming a micro-drama, the latest new-media format to emerge from China, is just as fast-paced as watching one. “It’s soaps on steroids,” a scriptwriter explains.

A cross between TikTok and Netflix, micro-dramas are mini soap operas designed for the smartphone generation. Episodes are filmed in a vertical format and last just over a minute each. The acting tends to be histrionic, the storylines often absurd, with titles like “I Actually Had a Flash Marriage with an Abstinent Male God”. But the bite-sized sagas are perfect for China’s young working professionals: long commutes and gruelling schedules leave little time for binge-watching box-sets on the sofa. Catering to their fragmented viewing habits, these shows

rake in millions of views—and millions of dollars. In 2025 they will extend their reach, attracting more viewers outside China.

A single micro-drama can cost over \$10 to watch, more than a month of Netflix, as the first few episodes are free of charge, with the rest behind a paywall. Yet viewers have been willing to splash out. The value of China’s micro-drama market leaped ten-fold between 2021 and 2023, and its estimated worth of \$5.3bn is expected to reach \$14bn by 2027. Even a government crackdown on “vulgar” content has not curbed domestic enthusiasm: larger film

companies are stepping in to scale up production, while more traditional streaming platforms are setting up their own micro-drama channels.

The mini web-shows are also breaking new ground as an experimental medium. In 2024 two short-form video platforms, Douyin and Kuaishou, released micro-dramas created using artificial intelligence (AI) for the first time. Nearly every aspect of production—from storyboarding and scripting to the actors themselves—involved AI, which accelerated complex processes and cut costs. The success and potential of AI micro-dramas has sent ripples through China’s wider entertainment industry: even box-office films are beginning to embrace the technology.

And Chinese-backed apps are spreading the love, delivering micro-dramas to new audiences outside China. Leading the charge are ReelShort and DramaBox, which don’t just translate Chinese series but also create original content with foreign actors, writers and directors. Some cultural nuances are still being teased out: shows like “Married for Green Card, Stayed for Love” are blatant, albeit awkward, attempts to appeal to Western viewers. “I feel like a clown,” an American actor sighs, bemoaning how Chinese producers insist on sticking to cheesy tropes and over-the-top acting.

The market is growing. Micro-drama apps have cumulatively amassed nearly 55m downloads and \$170m in revenue overseas, according to iiMedia Research, a data provider. These vertical shorts look poised to be more than a fleeting trend. Sometimes less really is more. ●



By Invitation

Why museums are turning themselves inside out

BUT WHERE have you hidden all the other stuff?" This is the perennial question for museum directors, as we are accused of secretly stockpiling vast, unseen treasure troves. The truth is, in our hunger for audiences, we always want to put the best material on display, and as much of it as possible. Yet today's visitors rightly demand ever more transparency and accountability around historic collections.

The coming year will see the latest example in a new era of access to public holdings with the opening of V&A East Storehouse in the Queen Elizabeth II Olympic Park in London. As "encyclopedic" museums in the global north wrestle with questions around the provenance and restitution of contested heritage, part of the response must be to reveal museums' hidden secrets and put everything on show.

From the Powerhouse Parramatta in Sydney, to Louvre Lens in the former coalfields of northern France, to the Boijmans in Rotterdam, museums around the world are opening up their back-of-house storage and expertise to engage new audiences and retain public trust. Like the chef's table in a smart restaurant, the inside-out museum is a growing trend, offering immediacy in access to objects and an immersive visitor experience.

When Prince Albert first conceived the Victoria & Albert Museum in the aftermath of the Great Exhibition of 1851, he hoped for "a great treasury or storehouse of art". With all the design flair and range of collections for which the V&A is famous, the V&A East Storehouse, opening in May 2025, offers a truly radical degree of public access. Liz Diller—a brilliant architect based in New York

Opening up museums' storehouses can improve transparency and accountability, says Tristram Hunt, director, V&A



who oversaw the Manhattan High Line, the Broad Museum in Los Angeles and a remarkable range of gallery exhibitions—has transformed what was once a vast, empty shed (originally built as the media centre for the 2012 London Olympics) into a sublime collections hall and self-guided public experience, allowing deep exploration of the hidden workings of a 21st-century museum.

With free admission, and floor after floor of open racking, visitors will be able to see every part of the V&A

Like the chef's table in a smart restaurant, the inside-out museum is a growing trend

collection—from couture fashion to Iznik tiles to Regency mirrors to Memphis pottery—for themselves. There are historic rooms (such as the smoulderingly cool, plywood Kauffman office, designed by Frank Lloyd Wright), galleries for tapestries and stage sets, and the David Bowie Centre, encompassing the rock star's archive, costumes and personal effects. A programme called "Order an Object" will let visitors access specific objects by booking an appointment online to see any artefact held at the Storehouse, at a time of their choosing.

In co-operation with youth and community groups, the Storehouse also promises scholarly transparency around the origins and ownership of objects—not least because

many of these items have a highly charged past. The Agra Colonnade, for example, is an exquisite example of Moghul design, ripped from the Red Fort in the early 19th century and brought to Britain for display. To ensure that the V&A has legitimacy, particularly with younger generations, it is essential that this colonial history and its legacies today are not ignored. This is not "decolonisation", but a strong, institutional determination to surface, interpret and disseminate difficult histories.

But we know that won't be enough. As museums bring more objects to light in open storage spaces, the coming year will also see further demands for the restitution of cultural artefacts from institutions in the global north. Many British national museums—such as the V&A and British Museum—remain hidebound by laws preventing the "de-accessioning" of material looted during the imperial past. But university and local-authority museums have been involved in returns to indigenous communities in Africa, Australia and North America. In Europe, Germany and the Netherlands (with a well-resourced Colonial Collections Committee) have led the way.

Amid all the controversies, what is so rewarding, from a museum director's perspective, is the continuing power of the object itself. For all the hype around digital immersion, AI and Google glasses, people want to see real things for themselves, not on screens, and want to see looted artefacts sent back home. What we hope to show at V&A East Storehouse is that material culture has lost none of its allure. And we welcome the public challenges that come with putting all the hidden stuff on show. ●

Obituary

The rings of Saturn

For nearly all of 2025, one of the most distinctive features of the solar system will disappear

Ann Wroe Obituaries editor,
The Economist

EVEN IN THE 21st century, odd astronomical events can be troubling. The eerie dimming of a lunar eclipse, or the strange, silent twilight of a solar one, can still send a shiver down the spine. Even when you know that the phenomenon is temporary and recurring, the vanishing of something familiar is still disconcerting. So it is with Saturn's rings.

For almost all of 2025, from March to November, the giant planet's distinctive rings will disappear. The reason is simple. The rings, which range in thickness from a few tens of metres to a few hundred, form a giant structure 282,000km wide—more than twice the width of the planet itself. They are made of ice and rock fragments that vary in size from boulders to grains of sand. As Saturn makes each 29-year voyage around the Sun, its tilt means the rings are illuminated from above for roughly half that time, and then from below for the other half. But at two points in between, its rings are exactly side-on to the Sun—and seem, to observers far away, to disappear.

Galileo Galilei, the first person to study Saturn through a telescope, was the first to see this. It shocked him profoundly. When he initially turned his instrument on Saturn, in July 1610, he concluded that the strange “ears” or “handles” on either side of the central orb were two separate bodies. Galileo assumed that the parts of this “composite of three” never moved nor changed; he had “no doubt as to its constancy”. The planet still had this “triform” shape in June 1612. But by the end of that year the “handles” had vanished. In a letter to a fellow star-gazer, he asked: “Has Saturn devoured his own sons?”

Galileo had touched precisely on why this vanishing mattered. Saturn was named after Saturnus, the Roman god of farming, who with his sickle taught human beings when to sow and when to reap: the inevitable cycle of birth, growth and death. Saturnus was the Roman version of the Greek god Cronos, a Titan who, fearing his own overthrow, devoured all the children born to him. Saturn was thus the planet of order and the progression of time, but also carried overtones of horror: the benign ruler who was also, in Francisco Goya's



imagination, an aged, goggle-eyed monster gorging himself on filial flesh.

Saturn has always had this double character. The Roman festival of Saturnalia in December celebrated both the bringer of peace and fruitfulness, synonymous with feasts and dancing, and the Lord of Misrule, who upended the social hierarchy. At Saturnalia masters waited on servants, and servants gave masters orders, a reversal that many Romans found seriously disturbing. Saturn was both order and confusion.

Something of this dichotomy comes through in Gustav Holst's “The Planets” of 1926, where Saturn's slow, deliberate march, the plod of a clock, builds into a terror of trombones. This movement, Holst's favourite, is subtitled “The Bringer of Old Age”. Of course, it must be so. Physical bodies inevitably fall to decay and die. Those heavy chords, based on bells Holst heard being rung at Durham Cathedral by two old men in black robes, are death coming. The quieter ending implies a possible acceptance.

Acceptance, though, is hard in the West

in the modern age. Youthfulness is worshipped, old age held at bay. A thousand products promise to keep the body undamaged, while scientists and doctors strive to extend life. Saturn's heavy tread is not welcome.

There are other reasons, too, to fear it. In the 1650s astronomers discovered that Galileo's “handles” were actually flat rings. They turned out to be made of icy shards, pieces of moons, asteroids and comets, torn apart by Saturn's forceful gravity. They are, to paraphrase W.G. Sebald, the detritus of vanished worlds; Saturn is “ever the domain of melancholy”, and of the lost, irrevocable past.

Accordingly, Sebald's “The Rings of Saturn” (1995) is one of the saddest books ever written. It is the tale of a journey round the Suffolk coast, past “fields of rubble”, “traces of destruction”, the remains of windmills and the carcasses of abandoned boats; through “disheartening” Lowestoft and the tiny railway halt at Somerleyton Hall, which is “nothing any more”. Digressions emphasise the human condition as a vast necropolis obsessed with death. “The history of the whole world”, Sebald writes, “...leads without fail down into the dark.”

Yet this is also a book that, notably, does not progress in anything like a straight line. No arrow of time links past, present and future in the old Newtonian way; it is a series of random encounters, memories and mysteries. And this, according to Carlo Rovelli, an Italian physicist, is how, in the quantum era, humans must imagine time. In “The Order of Time” (2017), he writes that there is no structure to it except what individuals experience for themselves. There is no commanding order, no sickle-god, no Holstian heavy tread. It is replaced by a vast “network of events” and “dances made to different rhythms”. We ourselves, with our confusions and distractions, are time.

As Saturn's rings vanish during 2025, so too does the constancy Galileo thought he observed in the strangest member of the Sun's family of planets. Cronos, the monstrous son-devourer, has indeed been overthrown. To cite Heraclitus's words from an age aeons before telescopes, the only constant in existence remains perpetual change. It must be embraced. ●

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EDUCATION

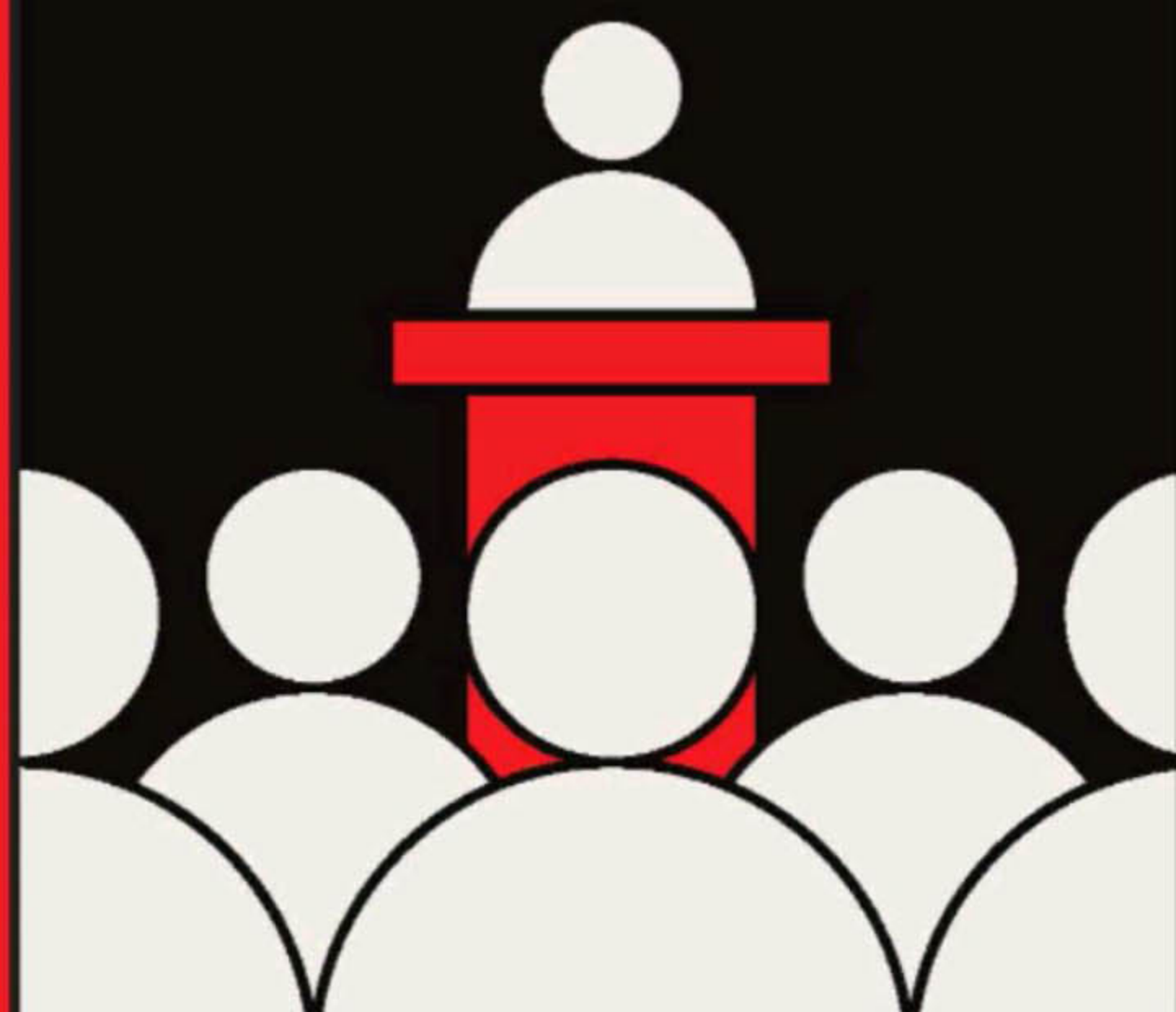
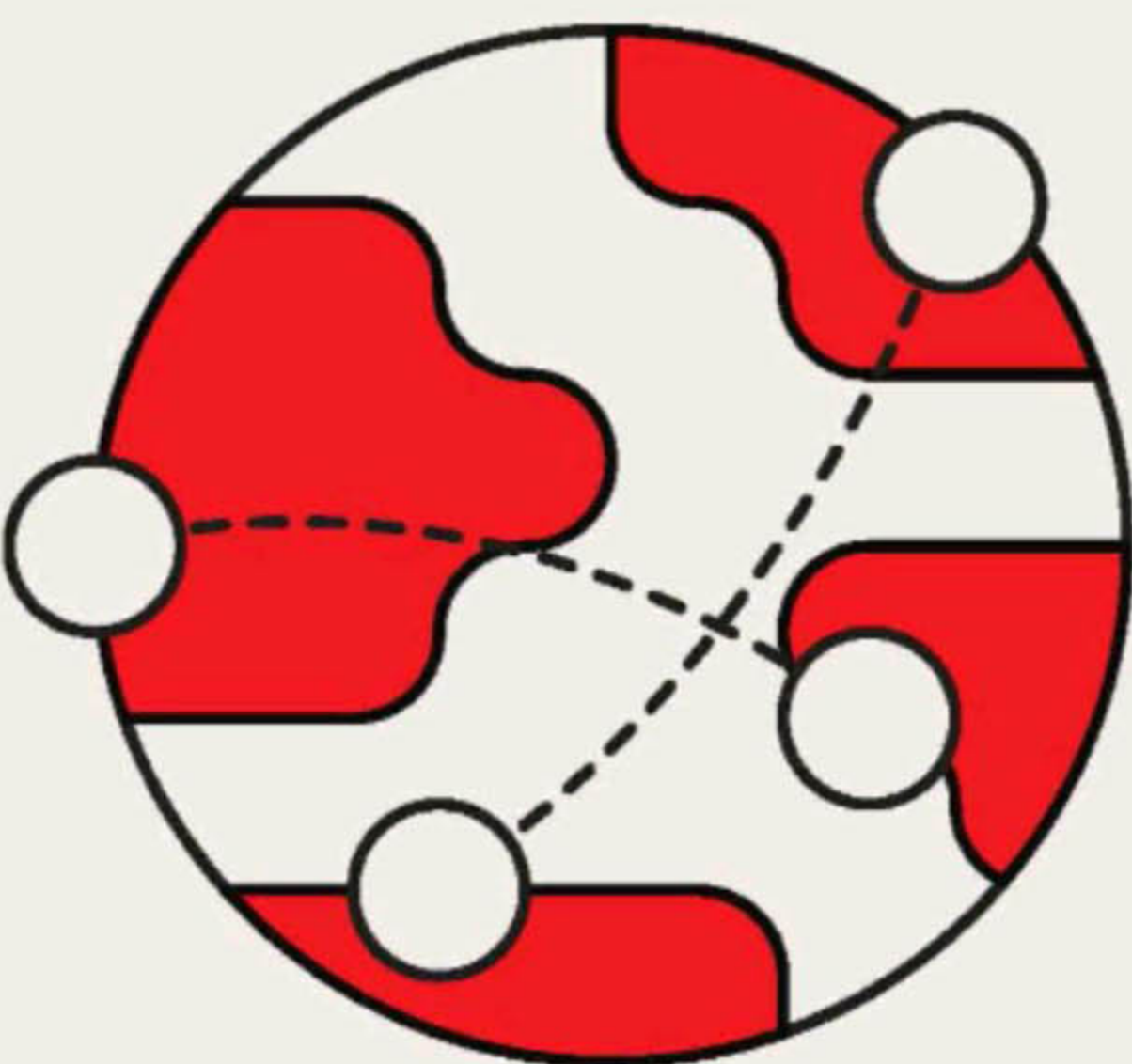
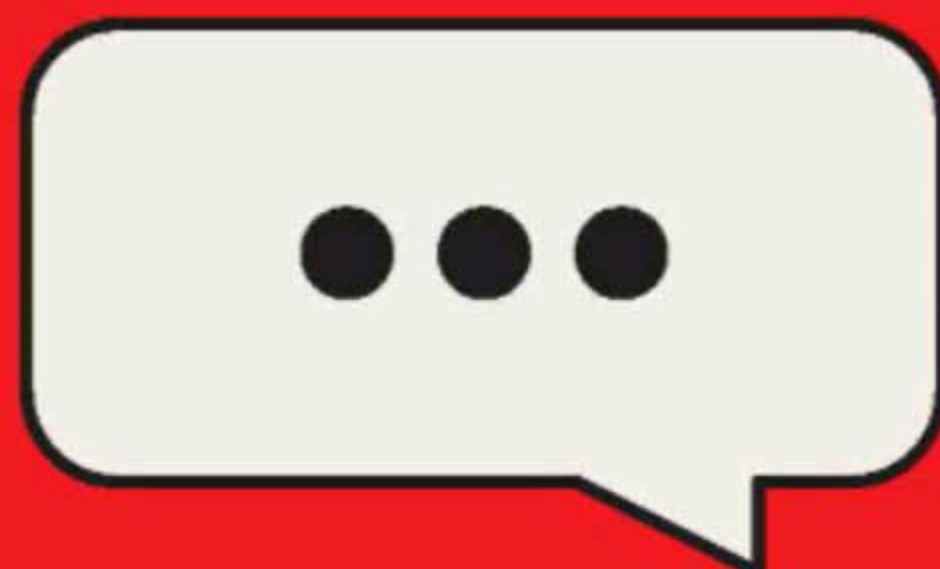
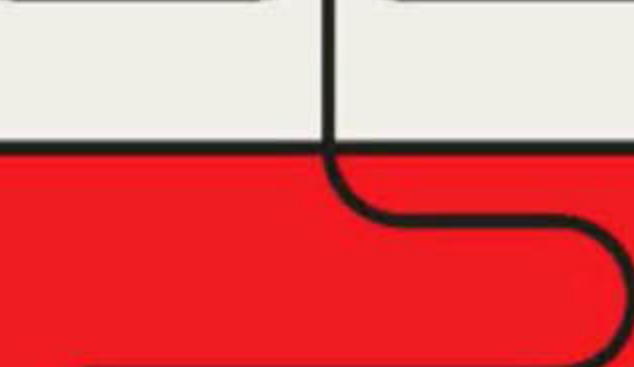
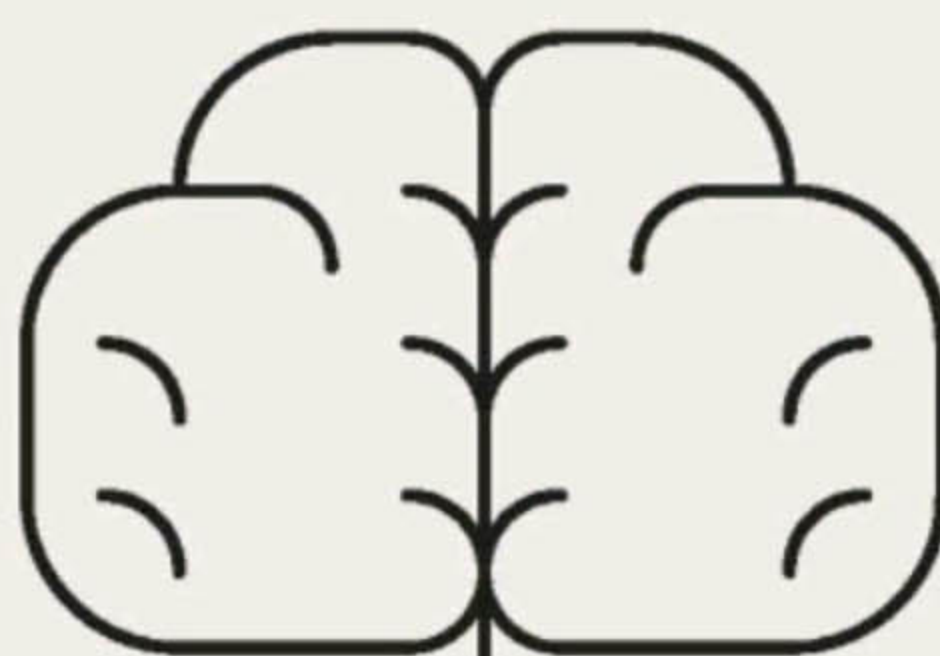
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